Matrox MXO2

Installation and User Guide (Mac OS version)

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Your notes

1

Introducing Matrox MXO2

This chapter lists the MXO2 system requirements, details the battery requirements and guidelines, and describes the MXO2 documentation.

Welcome to Matrox MXO2

Matrox MXO2 connects to your Mac system to provide broadcast-quality input/output, monitoring, and up/down/cross conversion to streamline your workflow with Apple Final Cut Studio. MXO2 provides built-in surround sound monitoring, as well as the flexibility to map any audio track in Final Cut Pro to any audio output. Through the use of proc amp controls (hue, chroma, contrast, brightness, and blue-only), you can adjust and control your HDMI monitor exactly as you would a broadcast HD/SD monitor. This control turns your HDMI monitor into a true-color video display with accurate color representation so that you can use your HDMI monitor even for color grading. For Matrox MXO2 products with Matrox MAX technology, the dedicated hardware processor accelerates the creation of H.264 files for Blu-ray Disc, the web, and mobile devices.

Matrox MXO2 system requirements

Matrox MXO2 requires a Mac system or Apple Xserve system with the following configuration:

Note For the most up-to-date system requirements, including the supported versions of the operating system and programs, see the Matrox MXO2 Support section of our website at www.matrox.com/video/support.

- Intel-based Mac Pro, MacBook Pro, iMac, or Apple Xserve.
- Mac OS X Lion v10.7.3.
- One free PCIe slot to install the Matrox PCIe host adapter (for desktops), or one free ExpressCard/34 slot to install the Matrox PCIe host ExpressCard/34 adapter (for laptops), or one free Thunderbolt port to connect the Matrox MXO2 Thunderbolt adapter.

Note An Apple Thunderbolt cable purchased from Apple is required to connect the Matrox MXO2 Thunderbolt adapter to your computer.

- We recommend an HDMI monitor that supports the following:
  - An HDMI input resolution of 1920×1080 for previewing all HD formats.
  - 1:1 pixel mapping for displaying your MXO2 output at its exact resolution, and for use with the Matrox HDMI Calibration Utility.

Supported programs

- Apple Final Cut Pro v7.0.3, Motion v4.0.3, Color v1.5.3, Soundtrack Pro v3.0.1, iTunes v10.6, and GarageBand v6.0.4.
- Adobe Premiere Pro v5.5.2, After Effects v10.5, Encore v5.1, Photoshop v12.1, Soundbooth v3.0, Audition v4.0, and Flash Media Live Encoder v3.2.1.

- Roxio Toast v11.0.4.
- CPC MacCaption v5.3.7.
- Boinx Software BoinxTV v1.8.4.
- Softron MovieRecorder v2.2.1, OnTheAir Video v2.4.6, and OnTheAir Video Express v1.0.2.
- ToolsOnAir Just:In v1.025.
- Avid Media Composer v5.5.3 (MXO2 Mini and MXO2 Mini with MAX only)

Note For instruction on using Avid Media Composer, download the *Using Matrox MXO2 Mini with Avid Media Composer* manual from the Matrox MXO2 Support section of our website at www.matrox.com/video/support.

- Telestream Wirecast v4.1.2.
- QuickTime Broadcaster v1.5.3.
- Boris FX Media 100 Suite v2.1.
- For Matrox MAX H.264 encoding:
  - Apple Compressor v3.5.3 and v4.0.2 (required for Blu-ray Disc).
  - Apple QuickTime Pro v7.6.6, Apple Final Cut Pro v7.0.3, Adobe Premiere Pro v5.5.2, Adobe After Effects v10.5, Adobe Encore v5.1, Adobe Media Encoder v5.5.1, Telestream Episode v6.2.2, Boris FX Media 100 Suite v2.1, Apple Motion v4.0.3, Apple Qmaster v3.5.3, Avid Media Composer v5.5.3 (MXO2 Mini with MAX only), or other QuickTime-based video applications.

Check our website for equipment information

For up-to-date information about recommended computer systems, batteries, and other MXO2-compatible devices, check the Matrox MXO2 Support section of our website at www.matrox.com/video/support.

Battery requirements and guidelines for MXO2

Note This section does not apply to Matrox MXO2 Rack and Matrox MXO2 Mini as they cannot be powered by a battery.

As an alternative to using an AC outlet, you can use a battery to power Matrox MXO2 or MXO2 LE. To avoid damage to your MXO2 system and peripheral devices when using a battery, please observe the following requirements and guidelines. For instructions on how to connect a battery, see “Powering MXO2” on page 14 or “Powering MXO2 LE” on page 34.

- Use a standard self-protected (fused) battery with a nominal voltage of 12V, 13.2V, or 14.4V. A higher-voltage battery will damage your MXO2 system.

- Disconnect MXO2 from the battery when not in use. Do not leave MXO2 connected to the battery when not in use as this may damage your MXO2 system and/or battery.
- Do not power your MXO2 using your vehicle's battery via the power socket.

Caution To avoid damage to your MXO2 system and peripheral devices, use a Matrox-recommended battery. For a list of batteries recommended for use with your MXO2, visit the Matrox MXO2 Support section of our website at www.matrox.com/video/support.

About this manual

This manual provides you with information about installing and using your Matrox MXO2 hardware and software, including how to configure your Matrox MXO2 for use with supported programs, such as Final Cut Pro and Adobe After Effects.

Style conventions

The following style conventions are used in this manual:

- The names of files, folders, and manuals appear in *italics*. For example:
  - The data is stored in the *Sample Movie* file.
  - The file is located in the *Clips* folder.
  - Please refer to your *Final Cut Pro User's Manual*.
- Menus and commands that you need to choose are displayed in the form **Menu > Command**. For example, **File > Save** means click **File** in the menu bar, then click **Save** in the menu that appears.

How video formats are expressed

With the exception of NTSC and PAL, all SD and HD video formats are expressed in the Matrox MXO2 documentation as follows:

VRp or **i** or **PsF** at **n fps**

Where:

- **VR** is the vertical resolution. For 1440×1080 video, however, both the horizontal and vertical resolutions are specified.
- **p** or **i** or **PsF** represents either progressive, interlaced, or progressive segmented frame video.
- **n fps** is the frame rate in frames per second.

Here are some examples:

- **486p** at **23.98 fps** Represents 720×486 progressive video at 23.98 frames per second.

- **720p** at **59.94 fps** Represents 1280×720 progressive video at 59.94 frames per second.
- **1440x1080i** at **29.97 fps** Represents 1440×1080 interlaced video at 29.97 frames per second. This format is used for HDV 1080i material.
- **1080i** at **29.97 fps** Represents full-size 1920×1080 interlaced video at 29.97 frames per second.

Last-minute information

Any important information that wasn't available for inclusion in this manual by publication time is provided to you in the *Matrox MXO2 Release Notes*.

Your notes

2

Installing Your Matrox MXO2 Hardware and Software

This chapter describes how to install the Matrox MXO2 hardware and software.

Before installing your Matrox hardware

Read the following information carefully before attempting to install Matrox hardware on your Mac system.

Start with a functioning system

Before attempting any Matrox MXO2 installation, you should have a Mac computer system with Mac OS X fully installed and functioning smoothly. This will avoid potential problems later on.

Avoid costly damage

Static electricity from your body can damage your Matrox PCIe host adapter or your computer. Although you may not notice it, static electricity is generated every time you move. It's often too small to cause a spark, but it can still cause damage to sensitive electronic components or at least reduce their lifespan.

To avoid damage, please observe the following precautions:

- Do not remove your Matrox PCIe host adapter from its antistatic bag until you're ready to install it. Before removing the card, place the package within easy reach of the area where you intend to perform the installation.
- You should avoid touching the chips and other components on the circuit board. Try to handle the card by its edges.
- Try to work in an area where the relative humidity is at least 50%.
- Do not wear wool or synthetic clothing. These fabrics tend to generate more static electricity than cotton, which is best for this kind of work.
- Turn off the power switches on your computer and its connected components.

Once you've opened your computer, drain static electricity from your body by touching a bare metal surface on your computer chassis before you install or remove any parts of your system. If you have a grounding wrist strap, use it while handling and installing any components in your computer.

Installing your Matrox PCIe adapter

The Matrox PCIe adapter is the interface between your MXO2 and Mac system. Matrox provides dedicated adapters for use with Mac desktops or laptops. Use the Matrox PCIe host adapter with your Mac Pro or Apple Xserve system, and the Matrox PCIe host ExpressCard/34 adapter with your MacBook Pro laptop.

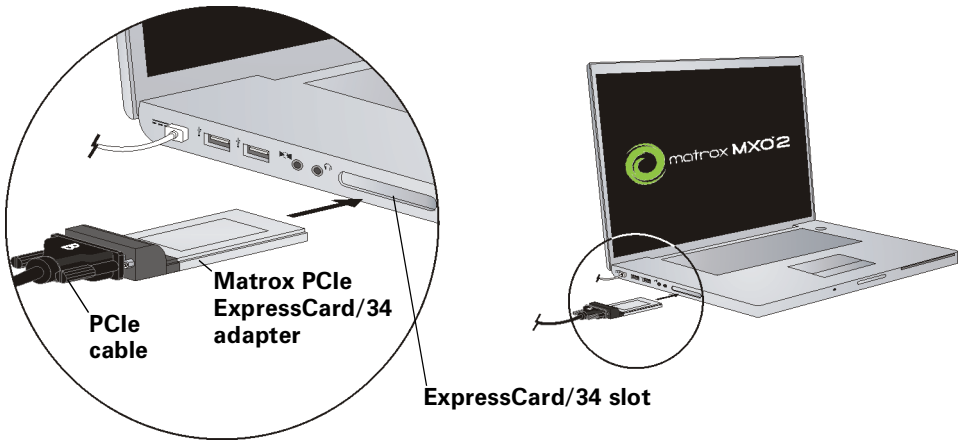
Installing your PCIe host adapter (for desktops)

The Matrox PCIe host adapter is a standard low-profile PCIe x1 card designed to operate in an Intel-based Mac Pro or Apple Xserve system. For detailed instructions on how to perform the following steps, refer to your Mac Pro or Xserve documentation.

1. Shut down your Mac Pro or Xserve, unplug the power cord and all the cables from the unit, and open the Mac Pro or Xserve chassis.
2. Insert the Matrox PCIe host adapter in an available PCIe slot in your Mac Pro or Xserve, and secure the adapter into place.
3. Close your Mac Pro or Xserve chassis, and reconnect the power cord and all the cables to the unit.

Installing your PCIe host ExpressCard/34 adapter (for laptops)

The Matrox PCIe host ExpressCard/34 adapter is designed to operate in your MacBook Pro's ExpressCard/34 slot. You can install the Matrox PCIe host ExpressCard/34 adapter when your MacBook Pro is on or off. Connect the Matrox PCIe cable to the host ExpressCard/34 adapter, and then insert the host adapter in your MacBook Pro's ExpressCard/34 slot until the adapter clicks into place. For details on how to safely remove your Matrox PCIe host ExpressCard/34 adapter from your MacBook Pro, see "Removing your PCIe host ExpressCard/34 adapter" on page 10.



Caution To ensure functionality and avoid damaging the PCIe cable or host connector, the side labeled "B" on the PCIe cable connector must face the top of the Matrox PCIe ExpressCard/34 adapter.

Removing your PCIe host ExpressCard/34 adapter

You can remove the Matrox PCIe host ExpressCard/34 adapter from your MacBook Pro when your MacBook Pro is on or off. However, you must power off the card before removing it.

Important Do not disconnect the PCIe cable from the Matrox PCIe host ExpressCard/34 adapter when your MacBook Pro is running. Instead, remove the adapter from your MacBook Pro with the Matrox PCIe cable attached.

1. Close all video/audio applications that are running on your system.
2. From the menu bar, click the ExpressCard icon ( ).
3. Click **Power off Card**.
4. Remove the Matrox PCIe host ExpressCard/34 adapter from your MacBook Pro's ExpressCard/34 slot.

Installing your Matrox MXO2 software

You can install the MXO2 software on a computer with or without the MXO2 hardware connected. To download and install the latest version of the MXO2 software, visit the MXO2 Support section of our website at www.matrox.com/video/support. You can also contact your MXO2 dealer for the latest software.

Remarks

- If you plan on working with Apple Final Cut Pro, Apple Compressor, or other QuickTime-based applications, you should install those applications before installing the MXO2 software. Adobe Premiere Pro users **must** install Premiere Pro to its default installation location before installing the MXO2 software.
- To avoid losing your custom Matrox MAX H.264 settings in Compressor (see "Creating a custom Matrox MAX H.264 setting" on page 104) when updating your MXO2 software, you must uninstall the MXO2 software that is installed on your system, restart your computer, and then install the new MXO2 software version **before** opening Compressor. If you open Compressor before installing the new MXO2 software, that is, with no MXO2 software installed on your computer, your custom Matrox MAX H.264 settings will be deleted by Compressor.

Updating your MXO2 firmware

When you install the MXO2 software while your MXO2 hardware is powered and connected to your Mac system, the software installation automatically verifies the firmware on your MXO2 hardware and updates it if required. However, if you install the MXO2 software on your Mac system without a

powered MXO2 connected, your MXO2 hardware may have a firmware version that is not supported by the installed MXO2 software. If your MXO2 hardware has an incompatible firmware version when you later connect the MXO2 hardware to your Mac system, the Matrox MXO2 preferences window options will be unavailable and a message regarding the incompatibility between the MXO2 software and MXO2 firmware will appear on the **Info** pane (see "Viewing MXO2 information" on page 76), along with a **Launch firmware updater** button.

To update the MXO2 firmware from the MXO2 preferences window, make sure your MXO2 hardware is powered and connected to your computer, and then click **Launch firmware updater** on the **Info** pane to run the Matrox Firmware Updater. You'll be required to shut down your system, with your MXO2 powered and connected to your computer, to complete the firmware update. If updating the firmware for Matrox MXO2 Mini, you must unplug your MXO2 Mini from the AC outlet, and then re-plug it before restarting your system.

Caution Do not disconnect or power off MXO2, or interrupt the firmware update during the update process. Doing so may damage your MXO2 hardware.

Alternately, you can update your MXO2 firmware by running the Matrox Firmware Updater from the Finder window as follows:

1. With your Mac system shut down, supply power to your MXO2, and connect it to your Mac system.
2. Start your computer.
3. In the **Finder** menu, choose **File > New Finder Window**.
4. Choose **Applications > Matrox MXO2 Utilities**, and double-click the firmware updater file to run the Matrox Firmware Updater. You'll be required to shut down your system, with your MXO2 powered and connected to your computer, to complete the firmware update. If updating the firmware for Matrox MXO2 Mini, you must unplug your MXO2 Mini from the AC outlet, and then re-plug it before restarting your system.

Removing your Matrox MXO2 software

Perform the following steps to remove the MXO2 software from your Mac system.

Important To avoid losing your custom Matrox MAX H.264 settings in Compressor (see "Creating a custom Matrox MAX H.264 setting" on page 104) when updating your MXO2 software, you must uninstall the MXO2 software that is installed on your system, restart your computer, and then install the new MXO2 software version **before** opening Compressor. If you open Compressor before installing the new MXO2 software, that is, with no MXO2 software

installed on your computer, your custom Matrox MAX H.264 settings will be deleted by Compressor.

1. In the **Finder** menu, choose **File > New Finder Window**.
2. Choose **Applications > Matrox MXO2 Utilities**, and double-click the software uninstaller file.
3. In the uninstaller dialog box, select or clear the **Delete the Matrox software user preferences** option. When selected, all current user settings in the Matrox MXO2 preferences window will be removed from your computer. Clear this option if you wish to keep your current MXO2 user settings for a future MXO2 software installation.
4. Click **Continue**.
5. Enter your administrator password, and click **OK** to remove the MXO2 software from your computer.

3

Connecting External Devices to Matrox MXO2

This chapter shows how to supply power and connect external devices to Matrox MXO2.

Note This chapter details how to connect external devices to Matrox MXO2 only. For another MXO2 product, see Chapter 4, “Connecting External Devices to Matrox MXO2 Rack”, Chapter 5, “Connecting External Devices to Matrox MXO2 LE”, or Chapter 6, “Connecting External Devices to Matrox MXO2 Mini.”

Available MXO2 connections

Matrox MXO2 features a full compliment of professional inputs and outputs, and allows you to connect multiple devices for up to five user-selectable simultaneous video outputs.

MXO2 video connections

- One HD HDMI input and one HD/SD HDMI output, both with up to eight channels of embedded audio support. The HDMI input/output supports YUV and RGB devices.
- One HD/SD SDI input and two HD/SDI outputs with up to 16 channels of embedded audio. Both SDI outputs simultaneously output the same video and embedded audio.
- One HD/SD analog component input/output, one S-Video input/output, and one composite input/output.
- Analog black burst reference input.

MXO2 audio connections

- Two balanced analog XLR inputs (stereo pair).
- Four balanced analog XLR outputs (two stereo pairs).
- One AES/EBU stereo input/output.
- Two unbalanced analog RCA inputs (stereo pair).
- Six unbalanced analog RCA outputs (for surround sound monitoring).

Powering MXO2

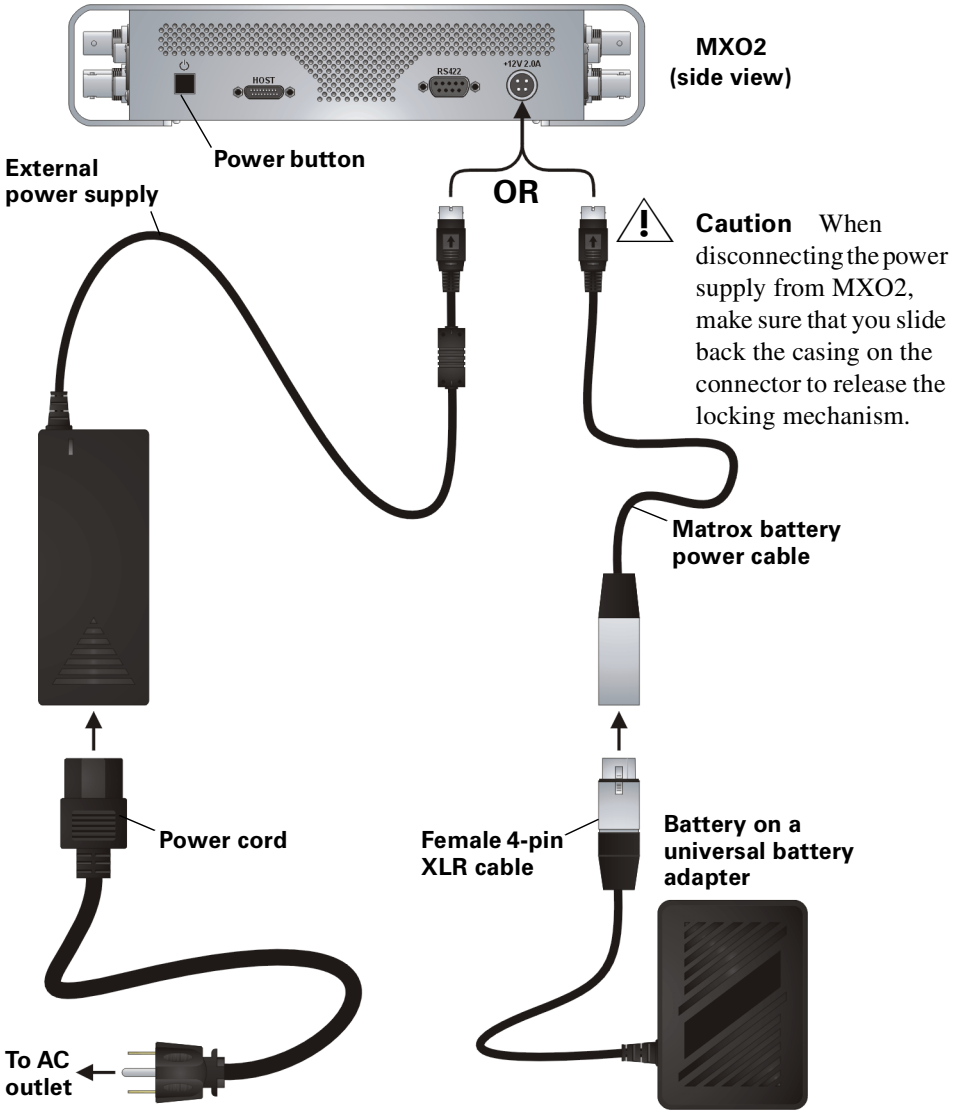
Supply power to MXO2 using an AC outlet via the Matrox external power supply and a power cord, or using a battery via the Matrox battery power cable. Matrox MXO2 connects to the battery via a 4-pin XLR connector. For information on how to connect your battery to portable video equipment, such as Matrox MXO2, contact the battery manufacturer. Before connecting MXO2 to a battery, please read the “Battery requirements and guidelines for MXO2” on page 3.

MXO2 power functionality

MXO2 features a power button that you can use to manually turn the MXO2 on and off. However, when power is supplied to MXO2 and it is connected to your Mac system, the MXO2 will turn on or off automatically when you start up or

shut down your Mac system. That is, when you shut down your Mac system, your MXO2 turns off. Starting up your Mac system turns your MXO2 on. To manually turn your MXO2 on, press the power button. To turn off your MXO2, press and hold the power button for at least two seconds.

Important When MXO2 is connected to a Mac system that is running, do not disconnect MXO2 from its power source, or power off MXO2. Shut down your Mac system before removing power from MXO2. If using a battery to power MXO2, ensure that the battery is sufficiently charged.



Connecting MXO2 to your Mac system

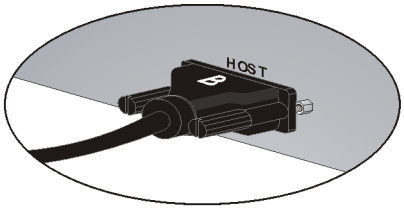
Connect MXO2 to your Mac system using the Matrox PCIe cable and the appropriate Matrox host adapter.

Ensuring proper PCIe cable connection

To ensure functionality and avoid damaging the PCIe cable or host connector when connecting MXO2 to your computer, the PCIe cable must be connected to your MXO2 and host connector as shown below:

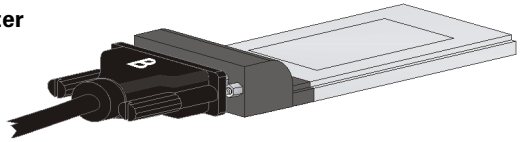
To Matrox MXO2

"B" side of PCIe cable must face the side labeled "HOST" on MXO2.



To Matrox PCIe ExpressCard/34 adapter

"B" side of PCIe cable must face the top of the Matrox PCIe ExpressCard/34 adapter.

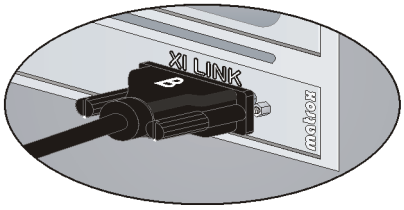


To Matrox MXO2 Thunderbolt adapter

"B" side of PCIe cable must face the side labeled "HOST" on the Matrox MXO2 Thunderbolt adapter.

To Matrox PCIe host adapter

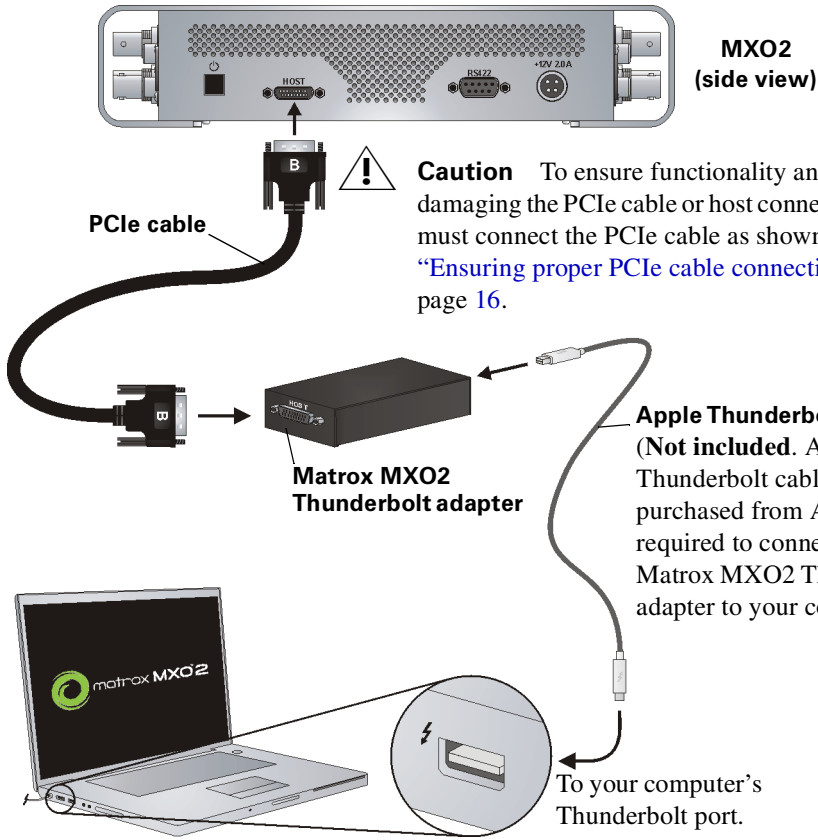
"B" side of PCIe cable must face the side labeled "XI LINK" on the Matrox PCIe host adapter.



Using the Matrox MXO2 Thunderbolt adapter

Use the Matrox MXO2 Thunderbolt adapter to connect MXO2 to your computer's Thunderbolt port. When doing this, it may take up to ten seconds for your MXO2 to be detected by your system and its applications.

Important Make sure that the Matrox PCIe cable is connected to the adapter and MXO2 before connecting the adapter to your computer via the Apple Thunderbolt cable. If you want to disconnect or connect MXO2 when your system is running, you must do it by disconnecting/connecting the Apple Thunderbolt cable. Do not disconnect the Matrox PCIe cable from the adapter, or MXO2, when your Mac system is running.



MXO2 (side view)

PCIe cable

Caution To ensure functionality and avoid damaging the PCIe cable or host connector, you must connect the PCIe cable as shown in "Ensuring proper PCIe cable connection" on page 16.

Matrox MXO2 Thunderbolt adapter

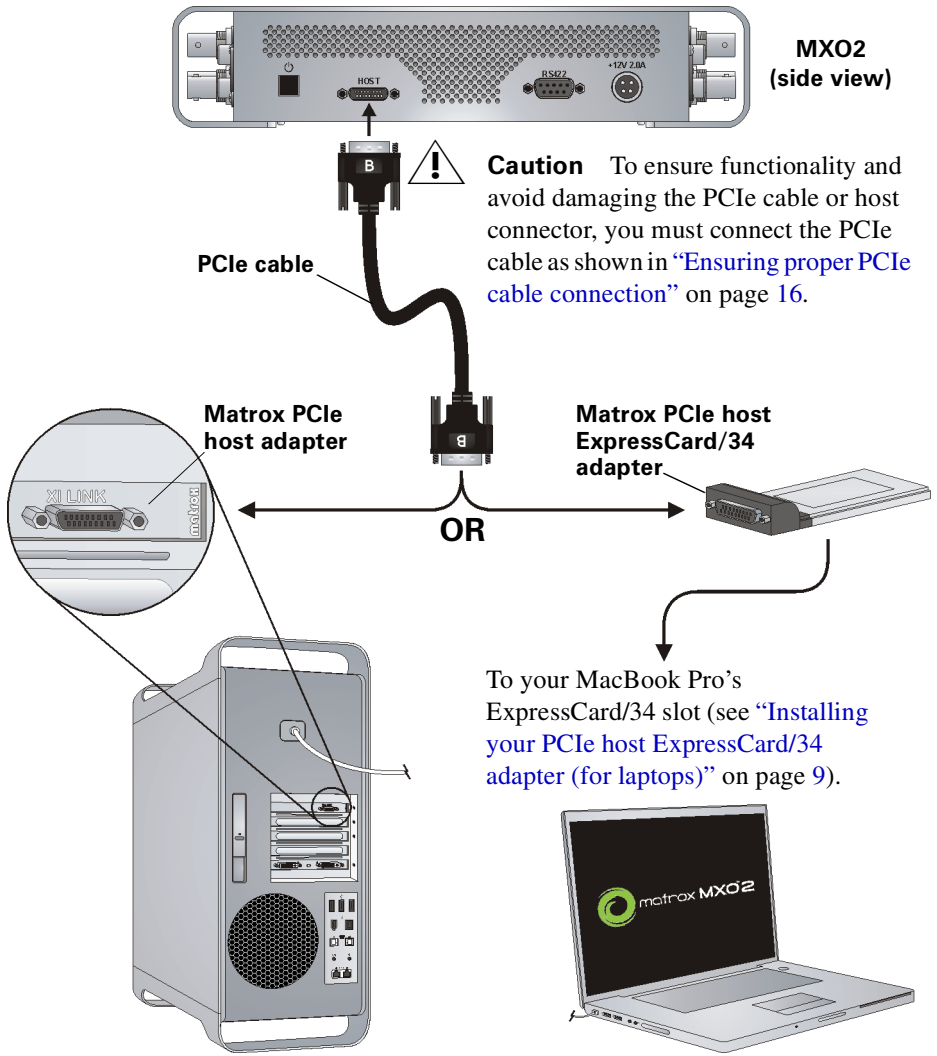
Apple Thunderbolt cable (**Not included**. An Apple Thunderbolt cable purchased from Apple is required to connect the Matrox MXO2 Thunderbolt adapter to your computer.)

To your computer's Thunderbolt port.

Using the Matrox PCIe host adapters

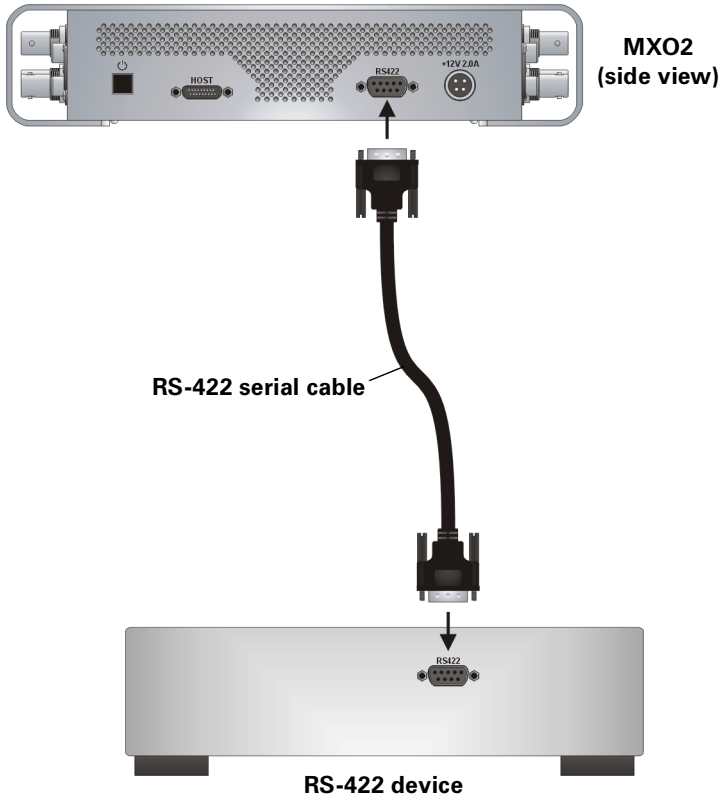
For MXO2 to be detected on a Mac Pro system, power must be supplied to MXO2 (see "Powering MXO2" on page 14), and it must be connected to your Mac Pro before starting up your computer.

Important Do not disconnect the Matrox PCIe cable from the adapter, or MXO2, when your Mac system is running. To safely remove the Matrox PCIe host Expresscard/34 adapter, see "Removing your PCIe host ExpressCard/34 adapter" on page 10.


MXO2
(side view)
HOST
RS422
+12V 2.0A
B
Caution To ensure functionality and avoid damaging the PCIe cable or host connector, you must connect the PCIe cable as shown in "Ensuring proper PCIe cable connection" on page 16.
PCIe cable
Matrox PCIe host adapter
Matrox PCIe host ExpressCard/34 adapter
OR
To your MacBook Pro's ExpressCard/34 slot (see "Installing your PCIe host ExpressCard/34 adapter (for laptops)" on page 9).
matrox MXO2

MXO2 RS-422 serial connection

MXO2's RS-422 serial connector allows an application, such as Final Cut Pro, to control a device that uses the RS-422 SMPTE time code protocol, such as a VTR or digital disk recorder, to ensure frame-accurate capture and edit-to-tape. For details on how to ensure accurate device control with Final Cut Pro, see "Ensuring frame-accurate capture and edit-to-tape" on page 92.

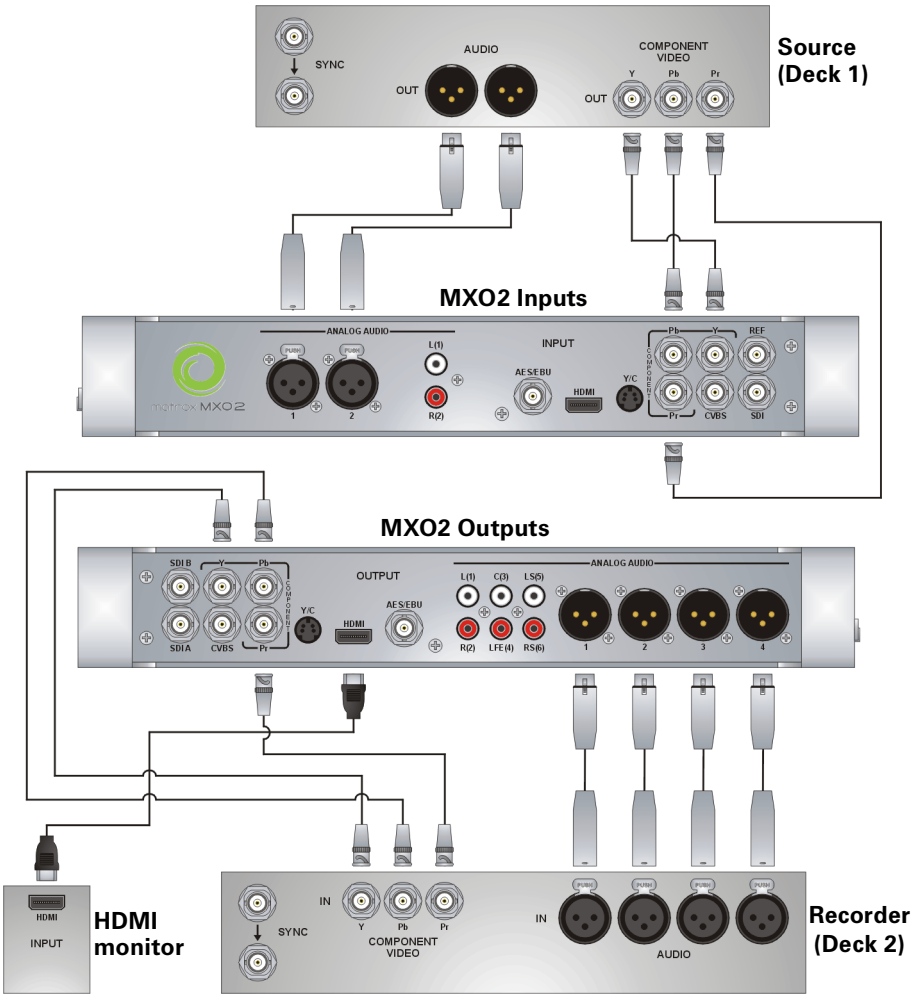


Typical Matrox MXO2 connections

In the following typical connection examples, we've connected a monitor to view the signal that will be recorded, and separate source and record decks. You may, however, use the same deck as both your source and record device by making the input and output connections to a single deck. For details on the Matrox MXO2 connectors, see Appendix B, "Matrox MXO2 Connectors."

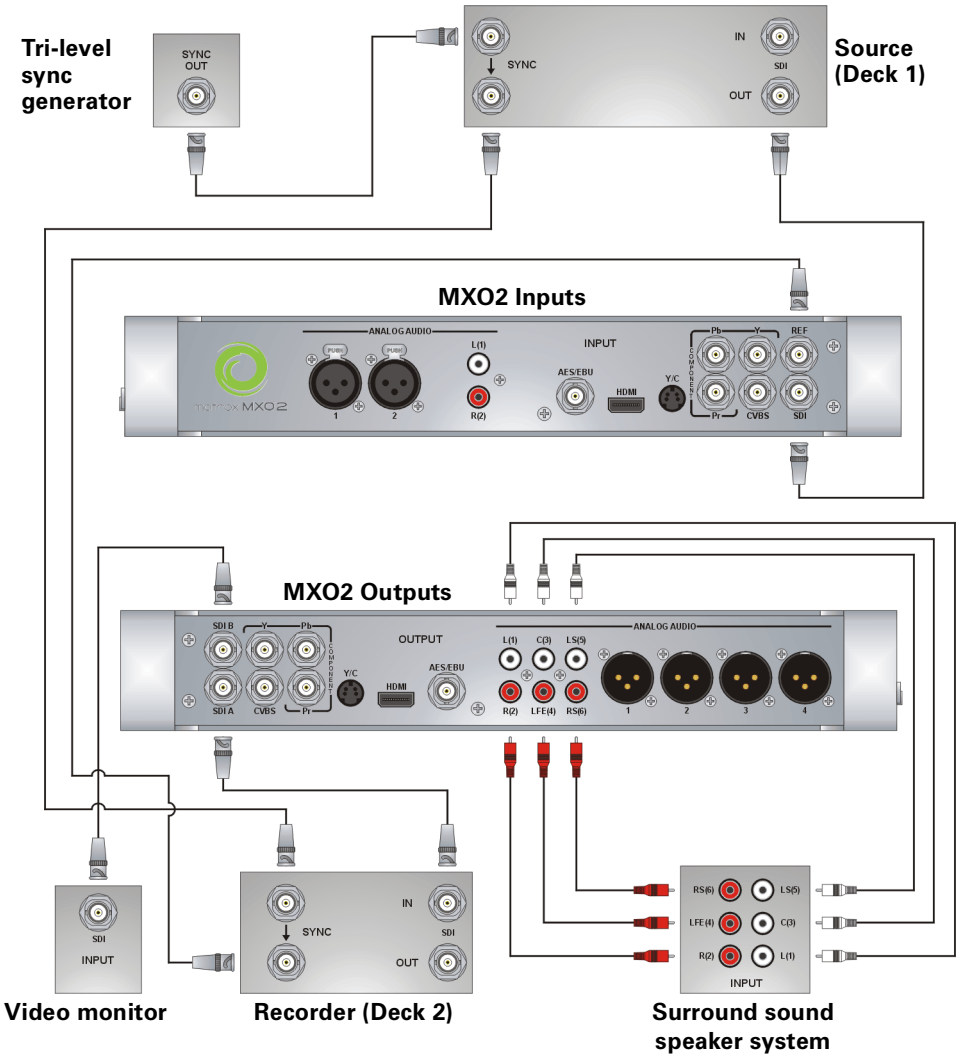
Analog component video connections

In this illustration, we're using analog component connectors for video, XLR connectors for audio, and an HDMI connector for video monitoring. The video is genlocked using MXO2's internal genlock.



Digital video connections

In this illustration, we're using SDI connectors for video and audio, an SDI connector for video monitoring, and we're monitoring the audio on a surround sound speaker system through RCA connectors. The video is genlocked using a tri-level sync generator.



Typical Matrox MXO2 connections

Your notes

4

Connecting External Devices to Matrox MXO2 Rack

This chapter shows how to rack mount, supply power, and connect external devices to Matrox MXO2 Rack.

Note This chapter details how to connect external devices to Matrox MXO2 Rack only. For another MXO2 product, see Chapter 3, “Connecting External Devices to Matrox MXO2”, Chapter 5, “Connecting External Devices to Matrox MXO2 LE”, or Chapter 6, “Connecting External Devices to Matrox MXO2 Mini.”

Available MXO2 Rack connections

Matrox MXO2 Rack features a full compliment of professional inputs and outputs, and allows you to connect multiple devices for up to five user-selectable simultaneous video outputs.

MXO2 Rack video connections

- One HD HDMI input and one HD/SD HDMI output, both with up to eight channels of embedded audio support. The HDMI input/output supports YUV and RGB devices.
- One HD/SD SDI input and two HD/SDI outputs with up to 16 channels of embedded audio. Both SDI outputs simultaneously output the same video and embedded audio.
- One HD/SD analog component input/output, one S-Video input/output, and one composite input/output.
- One analog black burst reference input and loop-through output.

MXO2 Rack audio connections

- Four balanced analog XLR inputs (two stereo pairs).
- Eight balanced analog XLR outputs (four stereo pairs).
- Two AES/EBU stereo inputs/outputs.

Rack mounting your MXO2 Rack

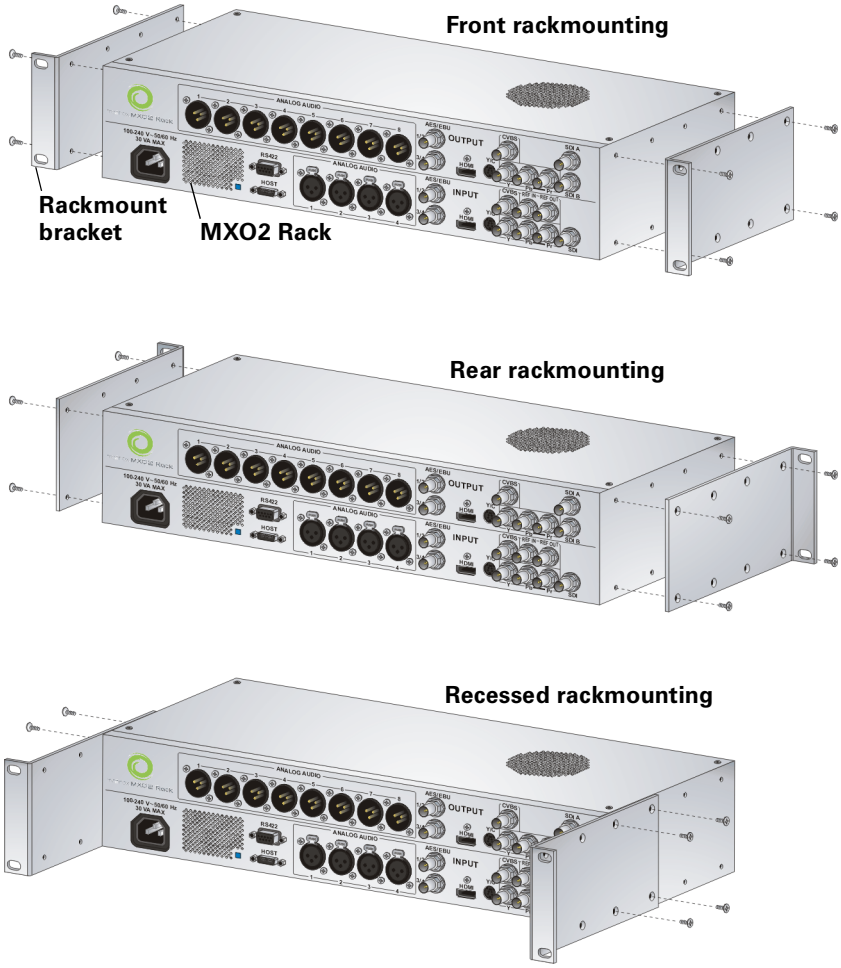
Use the supplied rackmount brackets to mount your Matrox MXO2 Rack to a standard 19-inch rack. The rackmount brackets can be used to either front or rear mount your MXO2 Rack. You can also mount MXO2 Rack so that it’s recessed to allow more space for cables. MXO2 Rack takes up two vertical rack unit spaces.

1 Unpack the two rackmount brackets and their eight mounting screws.

Caution Use only the screws supplied with your MXO2 Rack to attach the rackmount brackets to your MXO2 Rack. If you use screws that are larger or longer than the ones supplied, you can damage your equipment.

2 Depending if you want to front or rear mount your MXO2 Rack, position the rackmount brackets so that the bracket face is either towards the front (connector side) or the back of your MXO2 Rack.

3 MXO2 Rack can be recess mounted to allow extra space for connectors and cables. Depending on your mounting needs, align the screw holes on each rackmount bracket with the desired screw holes on either side of the MXO2 Rack.



Caution For stability and safety, whichever mounting method you choose, make sure to fasten each rackmount bracket to MXO2 Rack using all four supplied screws.

4 Using a hand screwdriver only (**no power screwdrivers**), carefully tighten each screw until snug. **Do not overtighten!**

5 Fasten your MXO2 Rack to the standard 19-inch rack as per your rack's instructions.

Powering MXO2 Rack

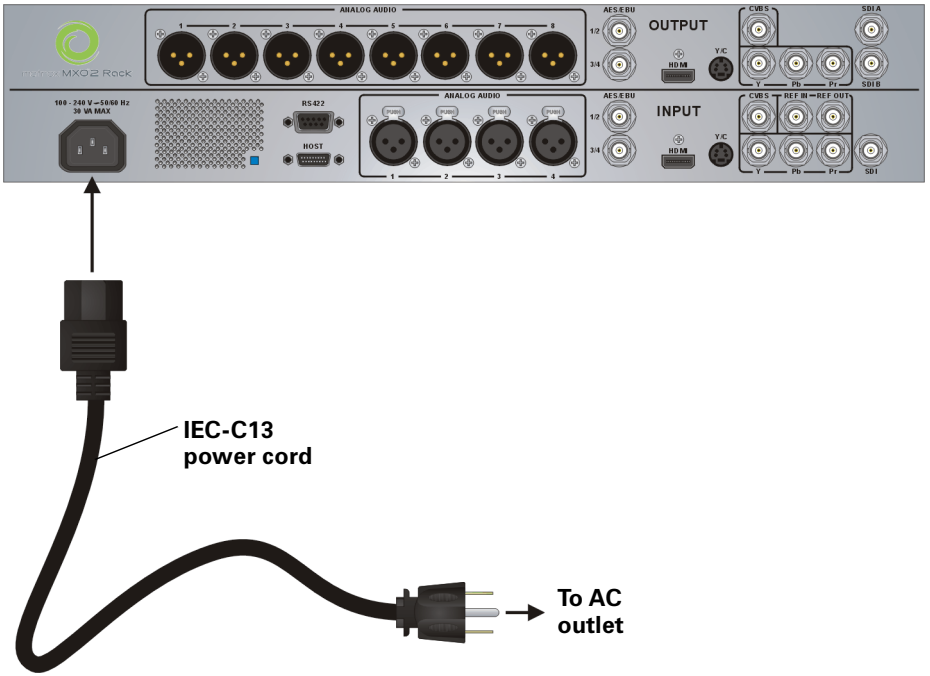
You can power MXO2 Rack using an AC outlet and an IEC-C13 power cord.

MXO2 power functionality

When power is supplied to MXO2 Rack and it is connected to your Mac system, the MXO2 Rack will turn on or off automatically when you start up or shut down your Mac system. That is, when you shut down your Mac system, your MXO2 Rack turns off. Starting up your Mac system turns your MXO2 Rack on.

Important When MXO2 Rack is connected to a Mac system that is running, do not disconnect MXO2 Rack from its power source. Shut down your Mac system before removing power from MXO2 Rack.

MXO2 Rack



Connecting MXO2 Rack to your Mac system

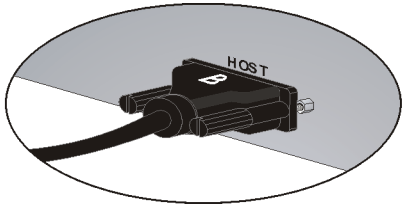
Connect MXO2 Rack to your Mac system using the Matrox PCIe cable and the appropriate Matrox host adapter.

Ensuring proper PCIe cable connection

To ensure functionality and avoid damaging the PCIe cable or host connector when connecting MXO2 Rack to your computer, the PCIe cable must be connected to your MXO2 Rack and host connector as shown below:

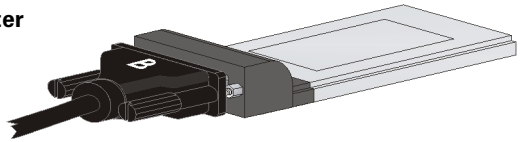
To Matrox MXO2 Rack

"B" side of PCIe cable must face the side labeled "HOST" on MXO2 Rack.



To Matrox PCIe ExpressCard/34 adapter

"B" side of PCIe cable must face the top of the Matrox PCIe ExpressCard/34 adapter.

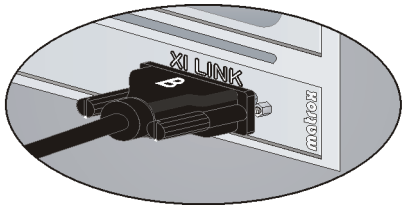


To Matrox MXO2 Thunderbolt adapter

"B" side of PCIe cable must face the side labeled "HOST" on the Matrox MXO2 Thunderbolt adapter.

To Matrox PCIe host adapter

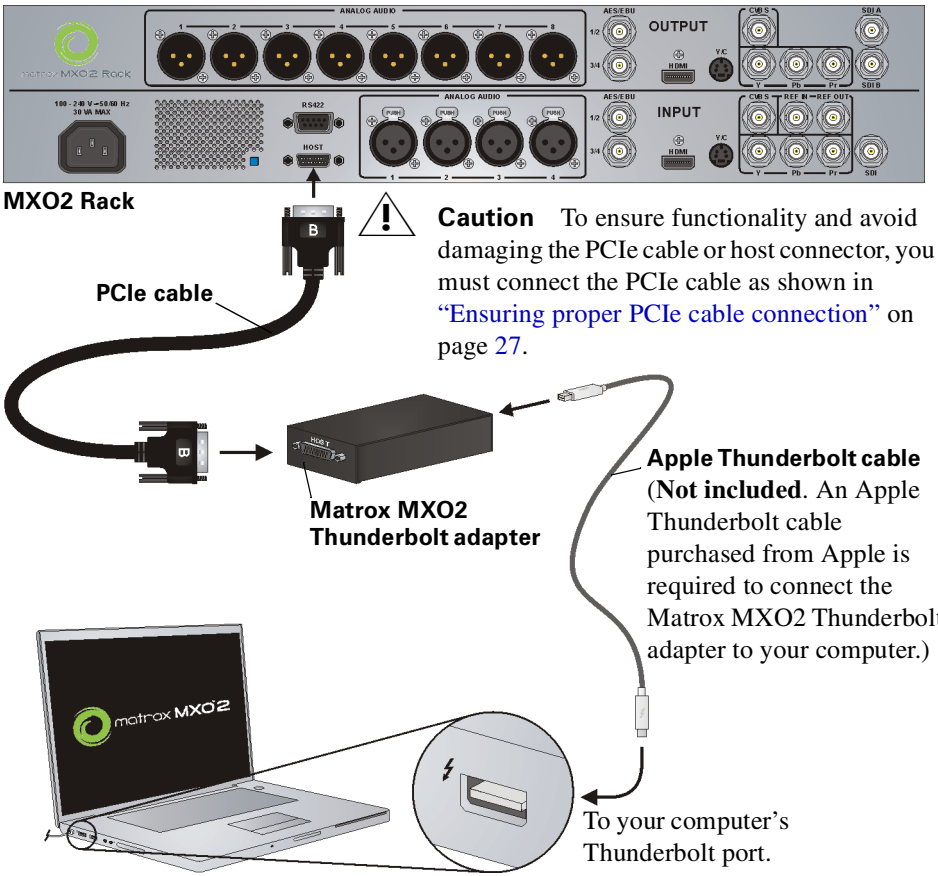
"B" side of PCIe cable must face the side labeled "XI LINK" on the Matrox PCIe host adapter.



Using the Matrox MXO2 Thunderbolt adapter

Use the Matrox MXO2 Thunderbolt adapter to connect MXO2 Rack to your computer's Thunderbolt port. When doing this, it may take up to ten seconds for your MXO2 Rack to be detected by your system and its applications.

Important Make sure that the Matrox PCIe cable is connected to the adapter and MXO2 Rack before connecting the adapter to your computer via the Apple Thunderbolt cable. If you want to disconnect or connect MXO2 Rack when your system is running, you must do it by disconnecting/connecting the Apple Thunderbolt cable. Do not disconnect the Matrox PCIe cable from the adapter, or MXO2 Rack, when your Mac system is running.

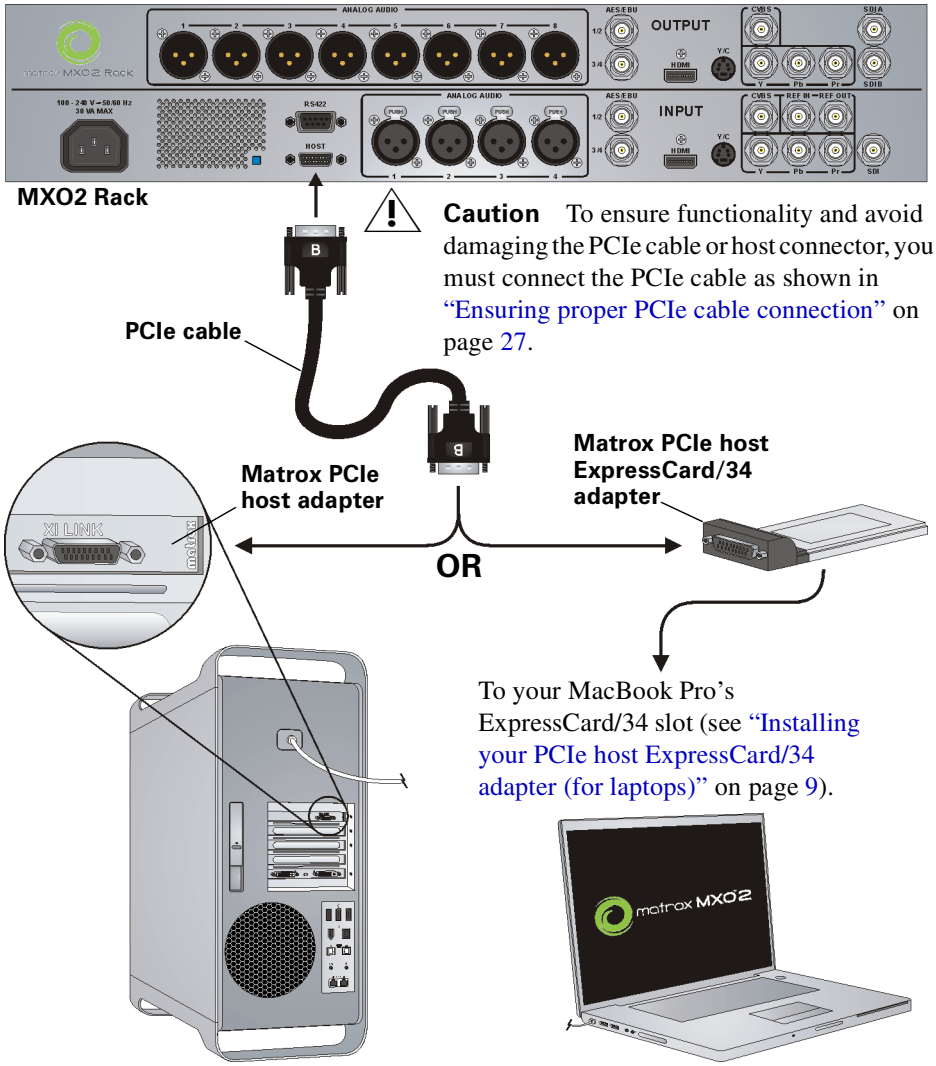


Caution To ensure functionality and avoid damaging the PCIe cable or host connector, you must connect the PCIe cable as shown in "Ensuring proper PCIe cable connection" on page 27.

Using the Matrox PCIe host adapters

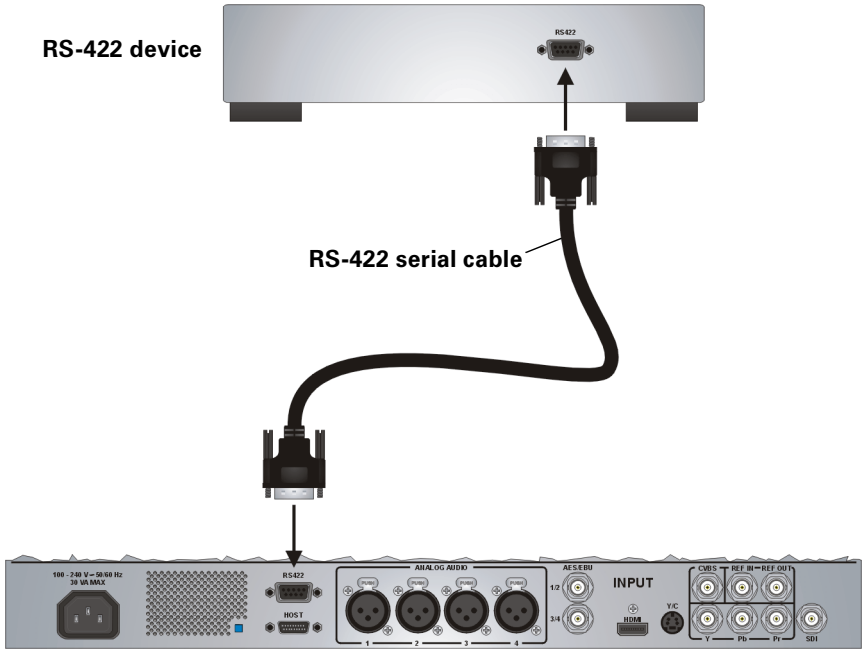
For MXO2 Rack to be detected on a Mac Pro system, power must be supplied to MXO2 Rack (see "Powering MXO2 Rack" on page 26), and it must be connected to your Mac Pro before starting up your computer.

Important Do not disconnect the Matrox PCIe cable from the adapter, or MXO2 Rack, when your Mac system is running. To safely remove the Matrox PCIe host Expresscard/34 adapter, see "Removing your PCIe host ExpressCard/34 adapter" on page 10.


MXO2 Rack
Caution To ensure functionality and avoid damaging the PCIe cable or host connector, you must connect the PCIe cable as shown in "Ensuring proper PCIe cable connection" on page 27.
PCIe cable
Matrox PCIe host adapter
Matrox PCIe host ExpressCard/34 adapter
OR
To your MacBook Pro's ExpressCard/34 slot (see "Installing your PCIe host ExpressCard/34 adapter (for laptops)" on page 9).

MXO2 Rack RS-422 serial connection

The Matrox MXO2 Rack RS-422 serial connector allows an application, such as Final Cut Pro, to control a device that uses the RS-422 SMPTE time code protocol, such as a VTR or digital disk recorder, to ensure frame-accurate capture and edit-to-tape. For details on how to ensure accurate device control with Final Cut Pro, see “Ensuring frame-accurate capture and edit-to-tape” on page 92.



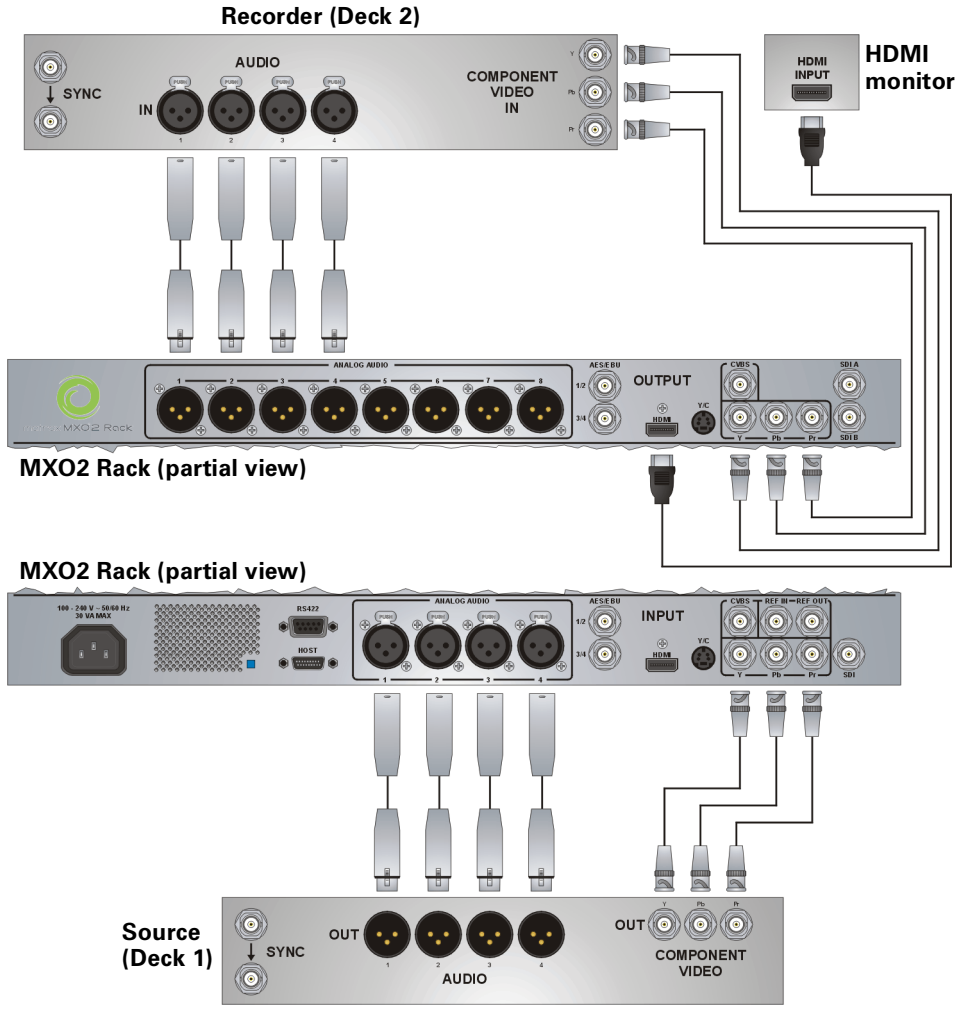
MXO2 Rack
(partial view)

Typical Matrox MXO2 Rack connections

In the following typical connection examples, we've connected a monitor to view the signal that will be recorded, and separate source and record decks. You may, however, use the same deck as both your source and record device by making the input and output connections to a single deck. For details on the Matrox MXO2 Rack connectors, see Appendix B, "Matrox MXO2 Connectors."

Analog component video connections

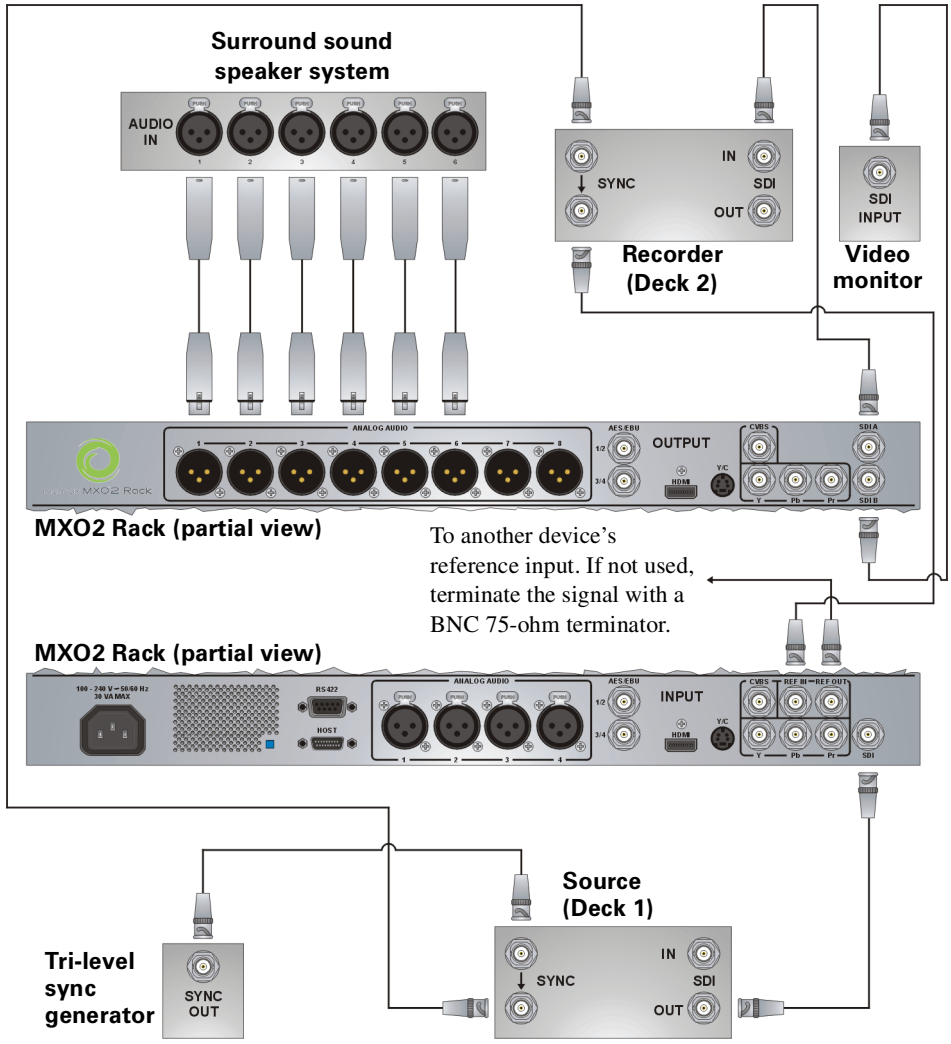
In this illustration, we're using analog component connectors for video, XLR connectors for audio, and an HDMI connector for video monitoring. The video is genlocked using MXO2's internal genlock.



Typical Matrox MXO2 Rack connections

Digital video connections

In this illustration, we're using SDI connectors for video and audio, an SDI connector for video monitoring, and we're monitoring the audio on a surround sound speaker system through XLR connectors. The video is genlocked using a tri-level sync generator.



5

Connecting External Devices to Matrox MXO2 LE

This chapter shows how to supply power and connect external devices to Matrox MXO2 LE.

Note This chapter details how to connect external devices to Matrox MXO2 LE only. For another MXO2 product, see Chapter 3, “Connecting External Devices to Matrox MXO2”, Chapter 4, “Connecting External Devices to Matrox MXO2 Rack”, or Chapter 6, “Connecting External Devices to Matrox MXO2 Mini.”

Available MXO2 LE connections

Matrox MXO2 LE features a full compliment of professional inputs and output, and allows you to connect multiple devices for up to five user-selectable simultaneous video outputs.

MXO2 LE video connections

- One HD HDMI input and one HD/SD HDMI output, both with up to eight channels of embedded audio support. The HDMI input/output supports YUV and RGB devices.
- One HD/SD SDI input and two HD/SDI outputs with up to 16 channels of embedded audio. Both SDI outputs simultaneously output the same video and embedded audio.
- One HD/SD analog component input/output, one S-Video input/output, and one composite input/output.
- Analog black burst reference input.

MXO2 LE audio connections

- Two balanced analog XLR inputs/outputs (stereo pair).
- Two unbalanced analog RCA inputs/outputs (stereo pair).

Powering MXO2 LE

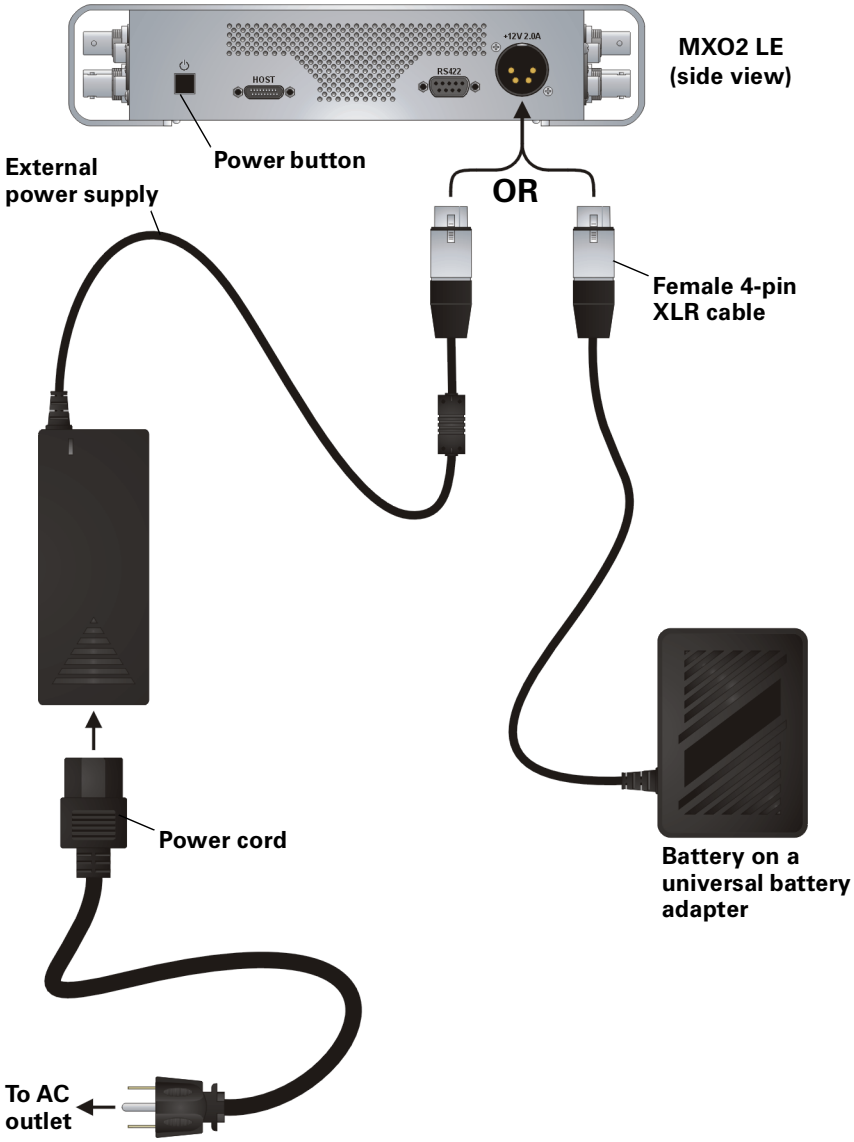
Supply power to MXO2 LE using an AC outlet via the Matrox external power supply and a power cord, or using a battery. Matrox MXO2 LE connects to the battery via a 4-pin XLR connector. For information on how to connect your battery to portable video equipment, such as Matrox MXO2 LE, contact the battery manufacturer. Before connecting MXO2 LE to a battery, please read the “Battery requirements and guidelines for MXO2” on page 3.

MXO2 LE power functionality

MXO2 LE features a power button that you can use to manually turn the MXO2 LE on and off. However, when power is supplied to MXO2 LE and it is connected to your Mac system, the MXO2 LE will turn on or off automatically when you start up or shut down your Mac system. That is, when you shut down your Mac system, your MXO2 LE turns off. Starting up your Mac system turns your MXO2 LE on. To manually turn your MXO2 LE on, press the power button.

To turn off your MXO2 LE, press and hold the power button for at least two seconds.

Important When MXO2 LE is connected to a Mac system that is running, do not disconnect MXO2 LE from its power source, or power off MXO2 LE. Shut down your Mac system before removing power from MXO2 LE. If using a battery to power MXO2 LE, ensure that the battery is sufficiently charged.



Connecting MXO2 LE to your Mac system

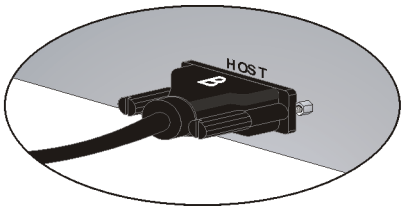
Connect MXO2 LE to your Mac system using the Matrox PCIe cable and the appropriate Matrox host adapter.

Ensuring proper PCIe cable connection

To ensure functionality and avoid damaging the PCIe cable or host connector when connecting MXO2 LE to your computer, the PCIe cable must be connected to your MXO2 LE and host connector as shown below:

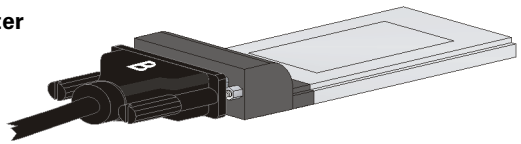
To Matrox MXO2 LE

"B" side of PCIe cable must face the side labeled "HOST" on MXO2 LE.



To Matrox PCIe ExpressCard/34 adapter

"B" side of PCIe cable must face the top of the Matrox PCIe ExpressCard/34 adapter.

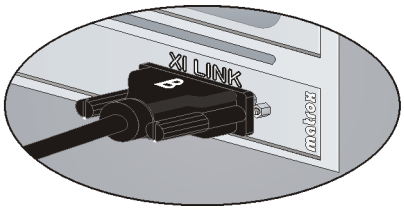


To Matrox MXO2 Thunderbolt adapter

"B" side of PCIe cable must face the side labeled "HOST" on the Matrox MXO2 Thunderbolt adapter.

To Matrox PCIe host adapter

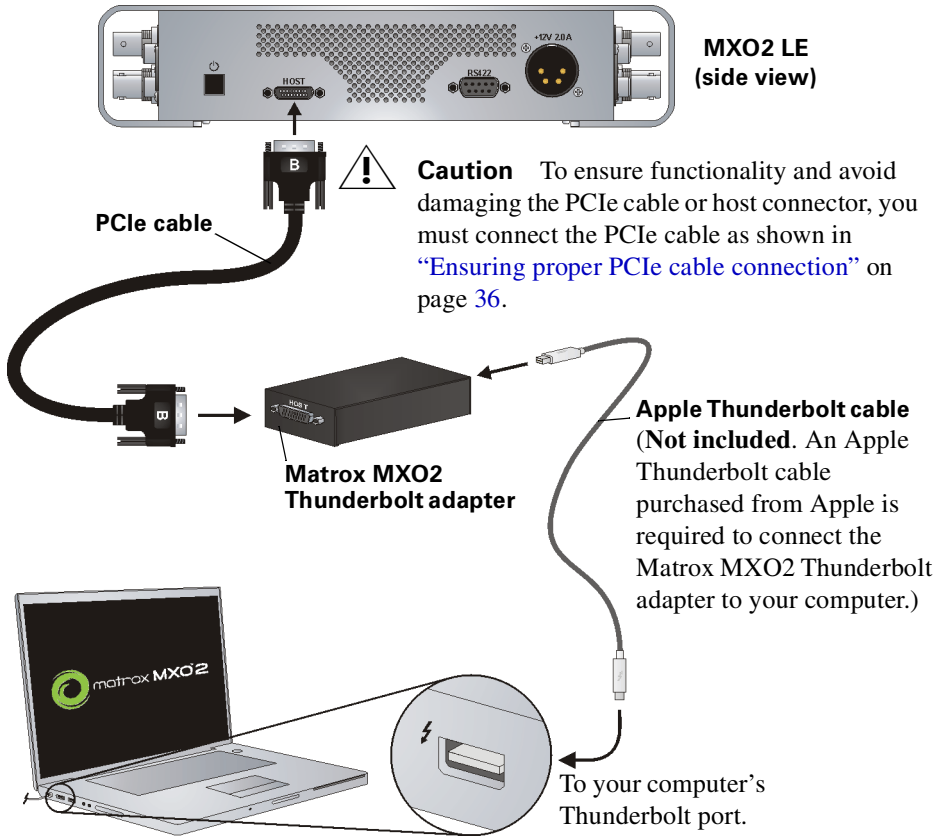
"B" side of PCIe cable must face the side labeled "XI LINK" on the Matrox PCIe host adapter.



Using the Matrox MXO2 Thunderbolt adapter

Use the Matrox MXO2 Thunderbolt adapter to connect MXO2 LE to your computer's Thunderbolt port. When doing this, it may take up to ten seconds for your MXO2 LE to be detected by your system and its applications.

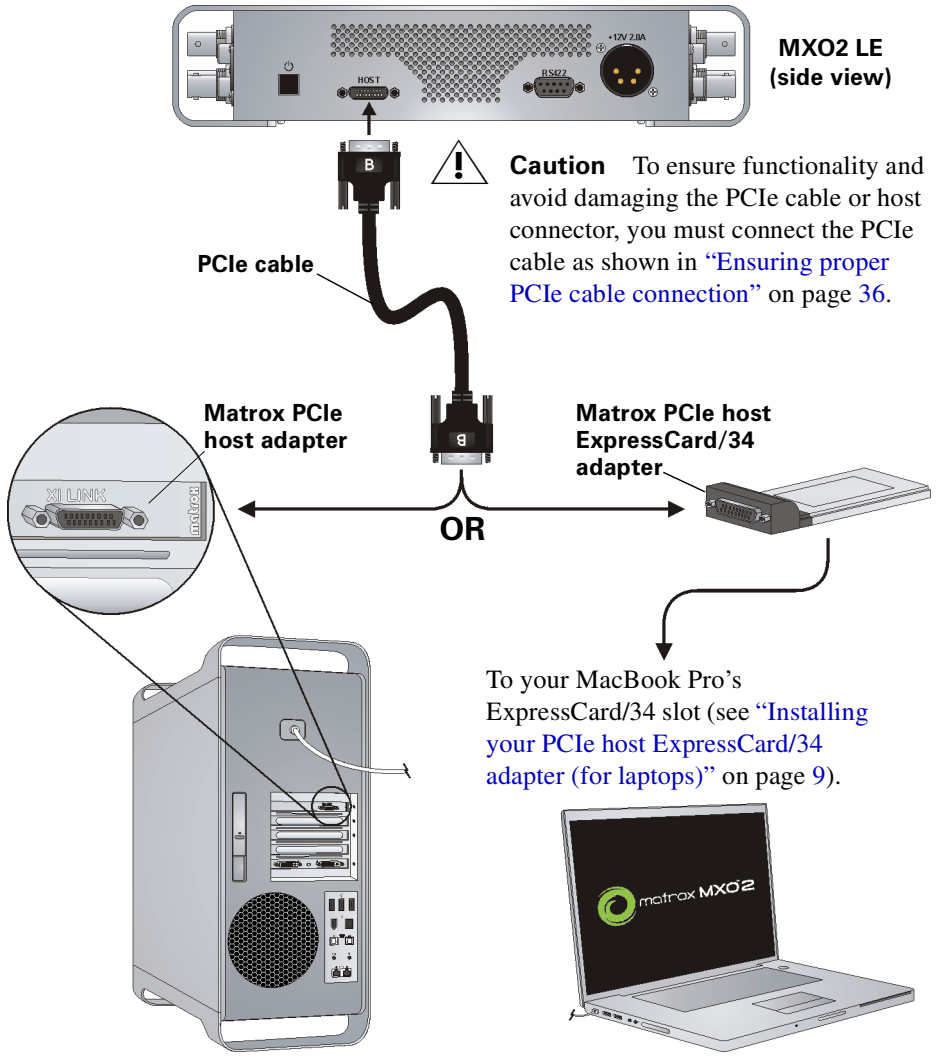
Important Make sure that the Matrox PCIe cable is connected to the adapter and MXO2 LE before connecting the adapter to your computer via the Apple Thunderbolt cable. If you want to disconnect or connect MXO2 LE when your system is running, you must do it by disconnecting/connecting the Apple Thunderbolt cable. Do not disconnect the Matrox PCIe cable from the adapter, or MXO2 LE, when your Mac system is running.


HOST
RS422
+12V 2.0A
MXO2 LE
(side view)
B
PCIe cable
Caution To ensure functionality and avoid damaging the PCIe cable or host connector, you must connect the PCIe cable as shown in "Ensuring proper PCIe cable connection" on page 36.
Matrox MXO2
Thunderbolt adapter
Apple Thunderbolt cable
(Not included. An Apple Thunderbolt cable purchased from Apple is required to connect the Matrox MXO2 Thunderbolt adapter to your computer.)
matrox MXO2
To your computer's
Thunderbolt port.

Using the Matrox PCIe host adapters

For MXO2 LE to be detected on a Mac Pro system, power must be supplied to MXO2 LE (see "Powering MXO2 LE" on page 34), and it must be connected to your Mac Pro before starting up your computer.

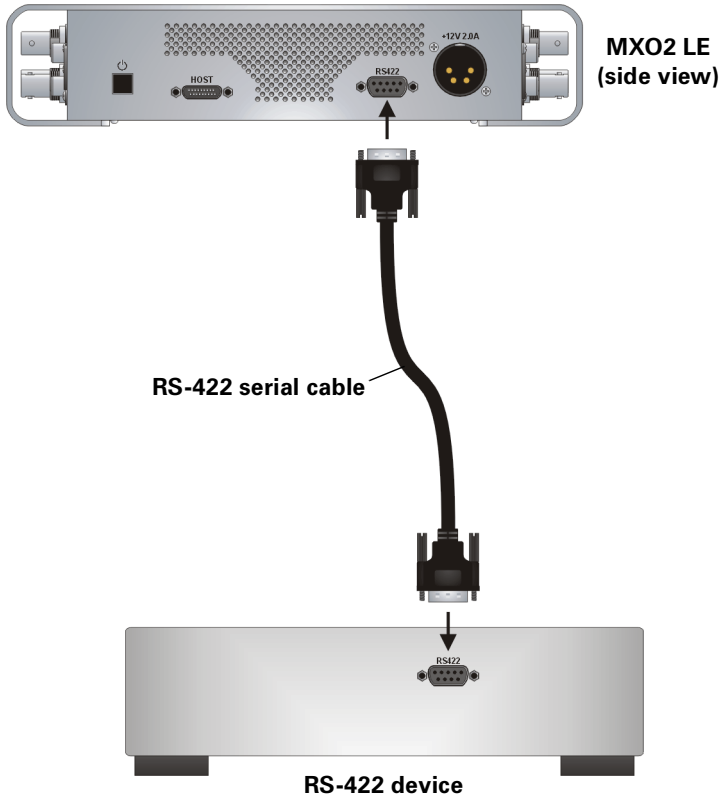
Important Do not disconnect the Matrox PCIe cable from the adapter, or MXO2 LE, when your Mac system is running. To safely remove the Matrox PCIe host Expresscard/34 adapter, see "Removing your PCIe host ExpressCard/34 adapter" on page 10.



Caution To ensure functionality and avoid damaging the PCIe cable or host connector, you must connect the PCIe cable as shown in "Ensuring proper PCIe cable connection" on page 36.

MXO2 LE RS-422 serial connection

MXO2 LE's RS-422 serial connector allows an application, such as Final Cut Pro, to control a device that uses the RS-422 SMPTE time code protocol, such as a VTR or digital disk recorder, to ensure frame-accurate capture and edit-to-tape. For details on how to ensure accurate device control with Final Cut Pro, see "Ensuring frame-accurate capture and edit-to-tape" on page 92.

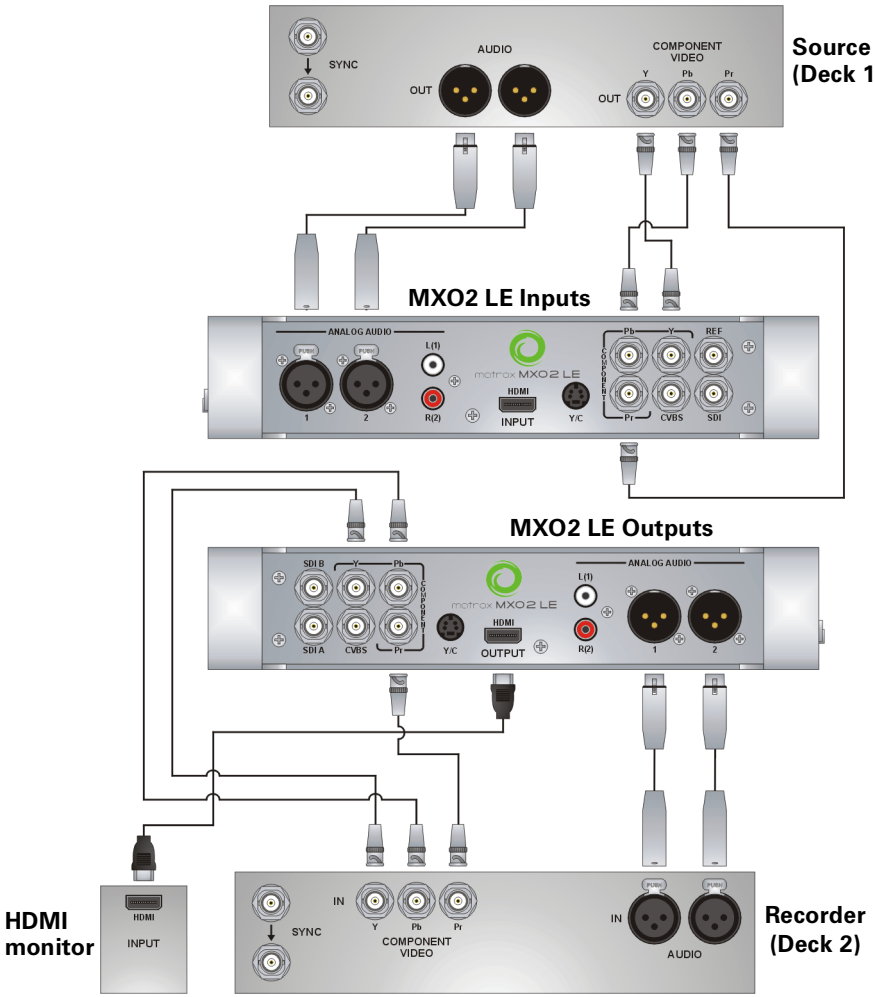


Typical Matrox MXO2 LE connections

In the following typical connection examples, we've connected a monitor to view the signal that will be recorded, and separate source and record decks. You may, however, use the same deck as both your source and record device by making the input and output connections to a single deck. For details on the Matrox MXO2 LE connectors, see Appendix B, "Matrox MXO2 Connectors."

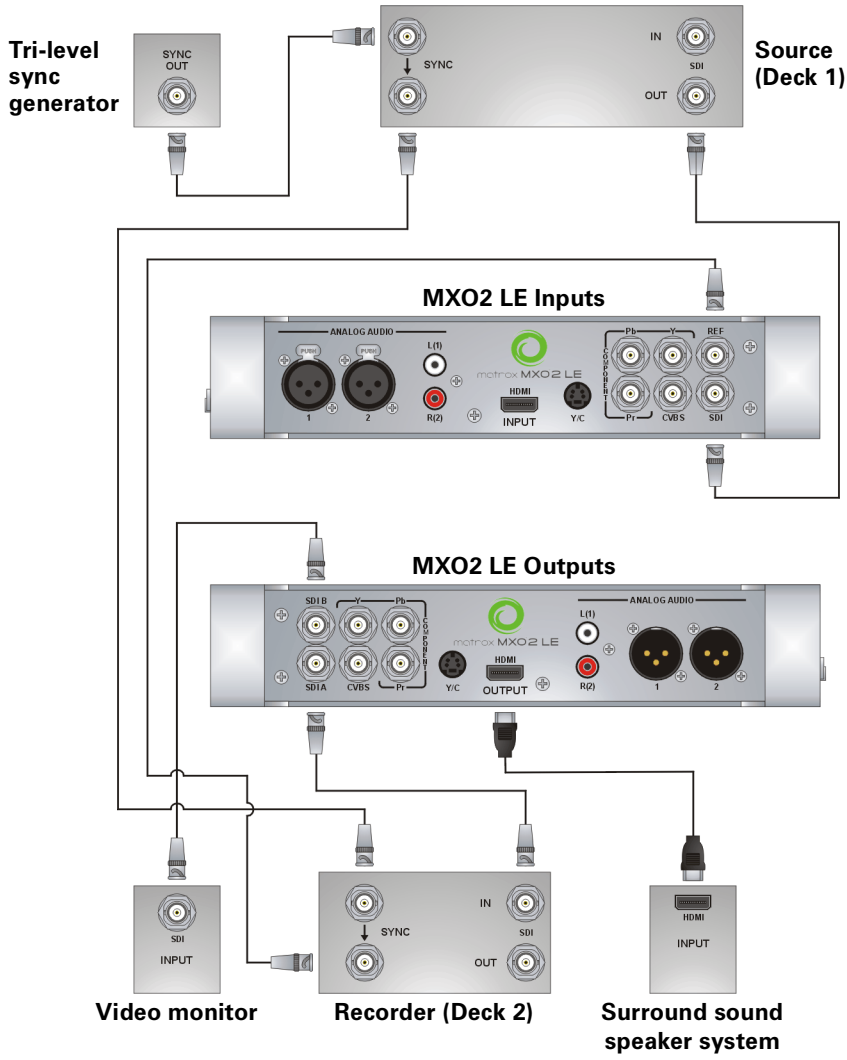
Analog component video connections

In this illustration, we're using analog component connectors for video, XLR connectors for audio, and an HDMI connector for video monitoring. The video is genlocked using MXO2 LE's internal genlock.



Digital video connections

In this illustration, we're using SDI connectors for video and audio, an SDI connector for video monitoring, and we're monitoring the audio on a surround sound speaker system through an HDMI connector. The video is genlocked using a tri-level sync generator.



Typical Matrox MXO2 LE connections

Your notes

6

Connecting External Devices to Matrox MXO2 Mini

This chapter shows how to supply power and connect external devices to Matrox MXO2 Mini.

Note This chapter details how to connect external devices to Matrox MXO2 Mini only. For another MXO2 product, see Chapter 3, “Connecting External Devices to Matrox MXO2”, Chapter 4, “Connecting External Devices to Matrox MXO2 Rack”, or Chapter 5, “Connecting External Devices to Matrox MXO2 LE.”

Available MXO2 Mini connections

Matrox MXO2 Mini provides inputs and outputs for connecting external devices, including HDMI, analog component, S-Video, and composite video devices.

MXO2 video and audio connections

- One HD HDMI input and one HD/SD HDMI output, both with up to eight channels of embedded audio support. The HDMI input/output supports YUV and RGB devices.
- One HD/SD analog component input/output, or one S-Video input/output and one composite input/output.

Note S-Video input/output is available by using the provided S-Video adapters (see “Connecting S-Video devices to MXO2 Mini” on page 49).

- Two unbalanced analog RCA audio inputs/outputs (stereo pair).

Powering MXO2 Mini

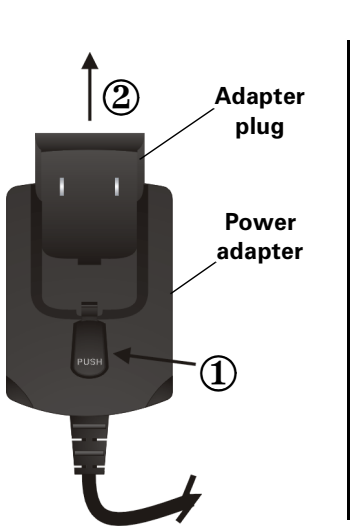
You can supply power to MXO2 Mini using an AC outlet via the Matrox external power supply cable. To turn MXO2 Mini off, unplug the Matrox external power supply cable from the AC outlet while your computer is shut down.

Important When MXO2 Mini is connected to a computer that is running, do not disconnect MXO2 Mini from its power source. Shut down your computer before removing power from MXO2 Mini.

MXO2 Mini power supply and adapter plugs

MXO2 Mini provides an external power supply cable with international adapter plugs for use in different regions:

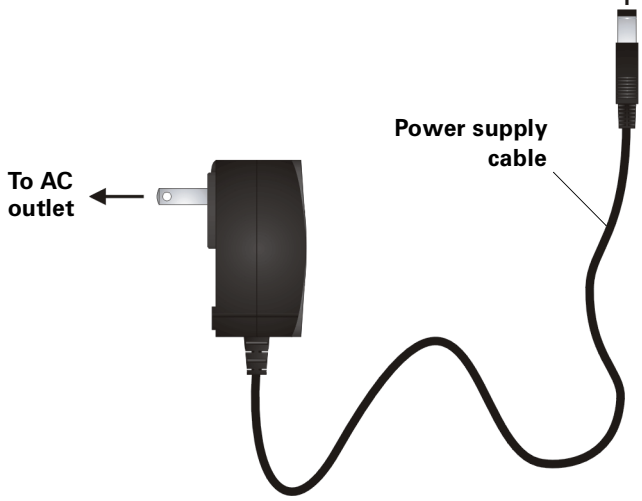
- To remove an adapter plug from the power adapter, hold down the button labeled **PUSH** on the power adapter, and then slide the adapter plug up until it releases from the power adapter.
- To insert an adapter plug into the power adapter, ensure that the adapter plug is properly aligned with the corresponding slot on the power adapter, and then slide the adapter plug down into the power adapter until it locks into place.



Removing an adapter plug

Inserting an adapter plug

MXO2 Mini



Powering MXO2 Mini

Connecting MXO2 Mini to your computer

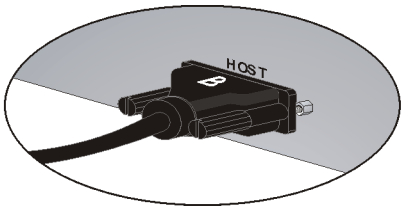
Connect MXO2 Mini to your Mac system using the Matrox PCIe cable and the appropriate Matrox host adapter.

Ensuring proper PCIe cable connection

To ensure functionality and avoid damaging the PCIe cable or host connector when connecting MXO2 Mini to your computer, the PCIe cable must be connected to your MXO2 Mini and host connector as shown below:

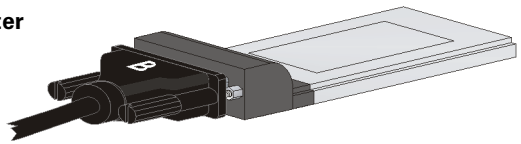
To Matrox MXO2 Mini

"B" side of PCIe cable must face the side labeled "HOST" on MXO2 Mini.



To Matrox PCIe ExpressCard/34 adapter

"B" side of PCIe cable must face the top of the Matrox PCIe ExpressCard/34 adapter.

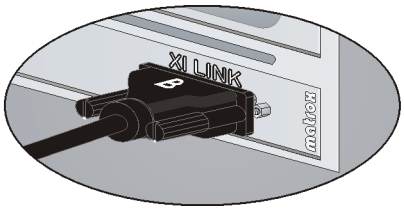


To Matrox MXO2 Thunderbolt adapter

"B" side of PCIe cable must face the side labeled "HOST" on the Matrox MXO2 Thunderbolt adapter.

To Matrox PCIe host adapter

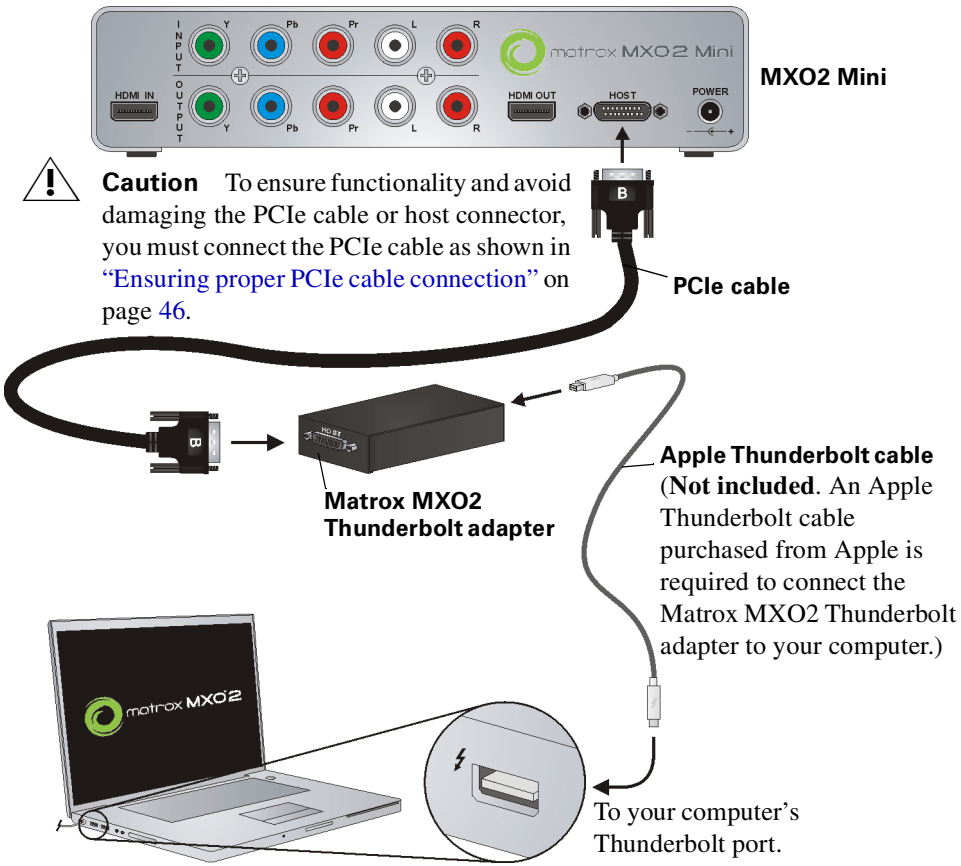
"B" side of PCIe cable must face the side labeled "XI LINK" on the Matrox PCIe host adapter.



Using the Matrox MXO2 Thunderbolt adapter

Use the Matrox MXO2 Thunderbolt adapter to connect MXO2 Mini to your computer's Thunderbolt port. When doing this, it may take up to ten seconds for your MXO2 Mini to be detected by your system and its applications.

Important Make sure that the Matrox PCIe cable is connected to the adapter and MXO2 Mini before connecting the adapter to your computer via the Apple Thunderbolt cable. If you want to disconnect or connect MXO2 Mini when your system is running, you must do it by disconnecting/connecting the Apple Thunderbolt cable. Do not disconnect the Matrox PCIe cable from the adapter, or MXO2 Mini, when your Mac system is running.

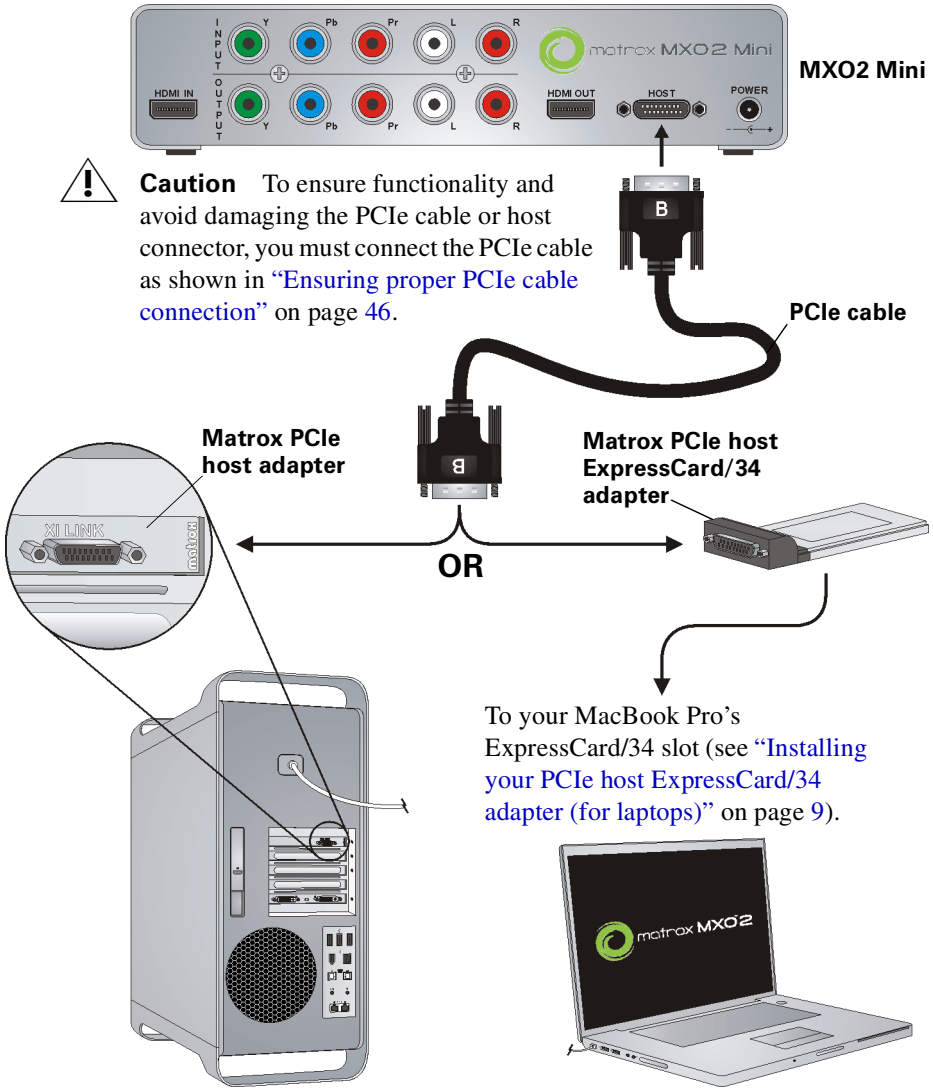


Caution To ensure functionality and avoid damaging the PCIe cable or host connector, you must connect the PCIe cable as shown in "Ensuring proper PCIe cable connection" on page 46.

Using the Matrox PCIe host adapters

For MXO2 Mini to be detected on your Mac Pro, power must be supplied to MXO2 Mini (see "Powering MXO2 Mini" on page 44), and it must be connected to your computer before starting up your system.

Important Do not disconnect the Matrox PCIe cable from the adapter, or MXO2 Mini, when your Mac system is running. To safely remove the Matrox PCIe host Expresscard/34 adapter, see "Removing your PCIe host ExpressCard/34 adapter" on page 10.

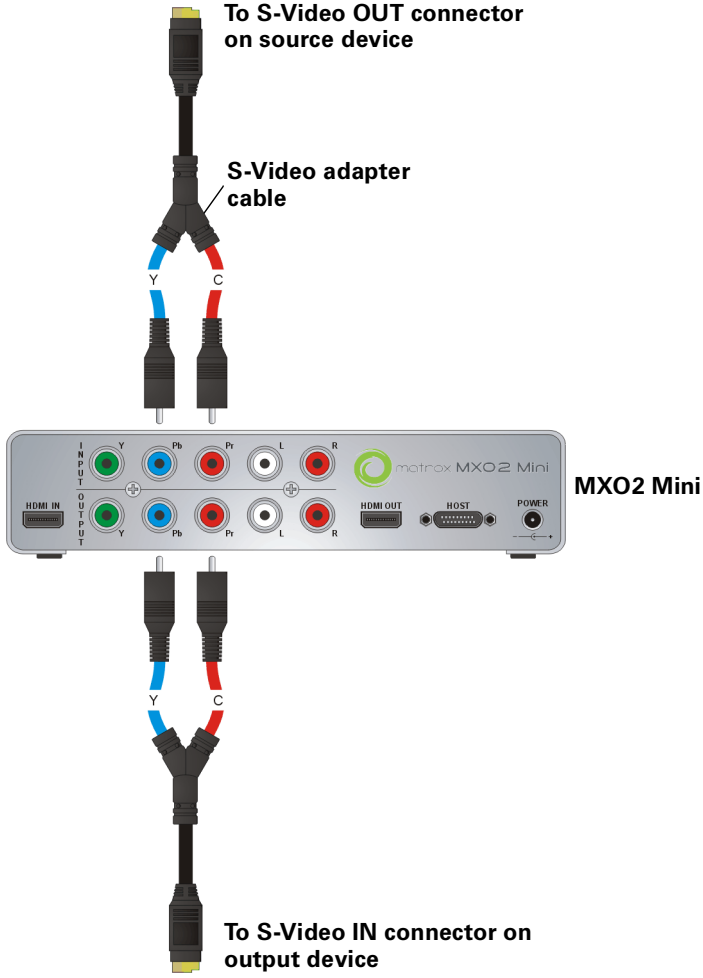


Caution To ensure functionality and avoid damaging the PCIe cable or host connector, you must connect the PCIe cable as shown in "Ensuring proper PCIe cable connection" on page 46.

Connecting S-Video devices to MXO2 Mini

To support S-Video connections on MXO2 Mini, your MXO2 Mini kit includes two S-Video adapter cables (one for S-Video input and one for S-Video output).

Note When you connect an S-Video device to MXO2 Mini, you won't be able to connect an analog component device at the same time.

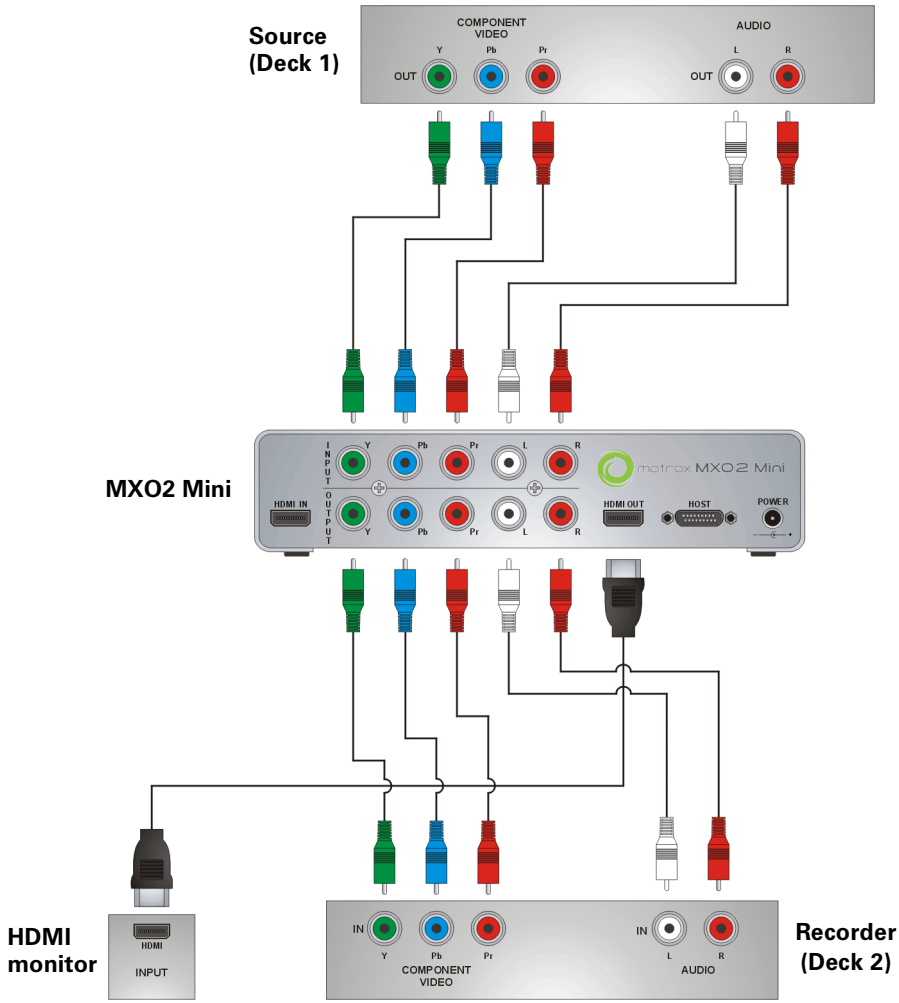


Typical Matrox MXO2 Mini connections

In the following typical connection examples, we've connected a monitor to view the signal that will be recorded, and separate source and record decks. You may, however, use the same deck as both your source and record device by making the input and output connections to a single deck. For details on the Matrox MXO2 Mini connectors, see Appendix B, "Matrox MXO2 Connectors."

Analog component video connections

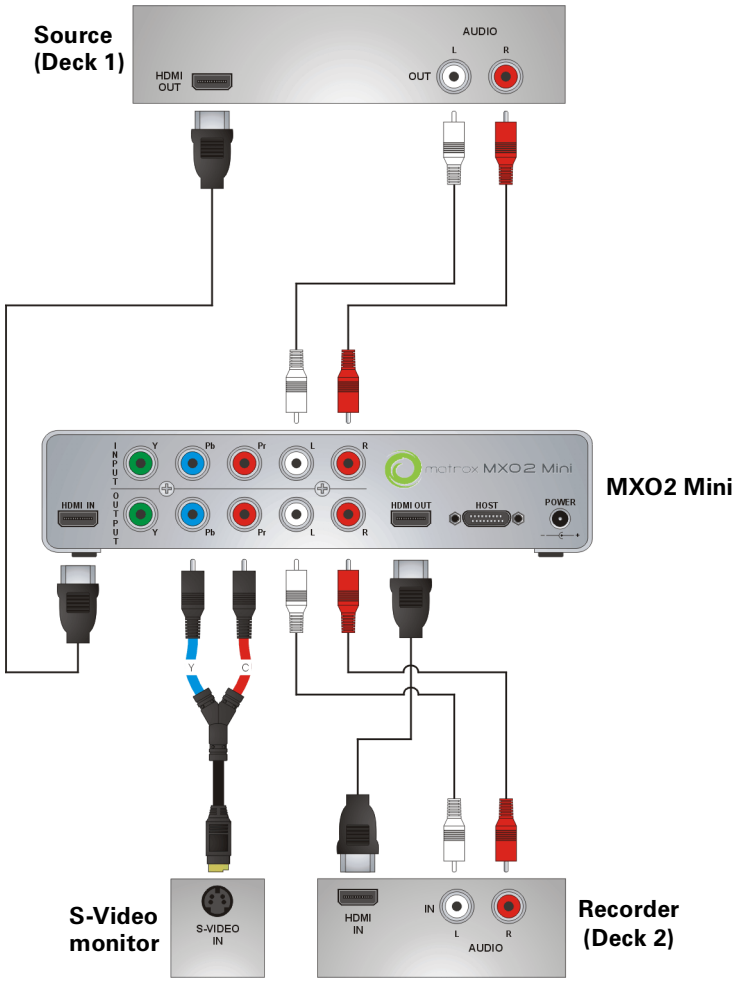
In this illustration, we're using component connectors for video, RCA connectors for audio, and an HDMI connector for video monitoring. The video is genlocked to the input source using MXO2 Mini's built-in genlock.



HDMI video connections

In this illustration, we're using HDMI for video, RCA connectors for audio, and S-Video for video monitoring. The video is genlocked to the input source using MXO2 Mini's built-in genlock.

Note When using HDMI connections, the embedded uncompressed HDMI audio is also available.



Typical Matrox MXO2 Mini connections

7

Configuring Your MXO2 System

This chapter explains how to configure your MXO2 settings.

Introduction

This chapter describes the settings in the MXO2 preferences window for all MXO2 products. The MXO2 preferences window allows you to specify various settings for working with MXO2. You can also save and load custom presets, and view information about your MXO2, such as the serial number and software version.

Depending on your MXO2 hardware, some of the options described in this chapter may not be available, and your Matrox MXO2 preferences window may not appear exactly as shown.

Remarks

- Before defining your settings, make sure that you've installed your MXO2 hardware, powered your MXO2, and connected your MXO2 to your Mac system.
- If you have an MXO2 product with Matrox MAX technology, the MXO2 inputs and outputs will not be available when creating H.264 files using the Matrox MAX H.264 codec. This limitation, however, does not apply if your system includes a Matrox CompressHD card. In this case, the Matrox MAX H.264 codec on your CompressHD card will always be used for the encoding, and your MXO2 inputs and outputs will be available when creating H.264 files. For details on using the Matrox MAX H.264 codec, see Chapter 10, "Using the Matrox MAX H.264 Codec."

Custom presets

You can save and load custom presets of your MXO2 preference settings.

Saving custom presets

Saving a custom MXO2 preference settings preset creates a *.plist* file that you can load at any time.

1. From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** or **Matrox MXO2 Mini** icon.
2. Specify your MXO2 settings.
3. Click **Save Preset**, specify a filename and location, and then click **Save**.

Important Do not save your preset, or overwrite any Matrox files, in *Users/~/Library/Preferences*.

Loading custom presets

You can load a custom MXO2 preference settings preset at any time. Your MXO2 settings are automatically updated when you load a preset.

1 From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** or **Matrox MXO2 Mini** icon.

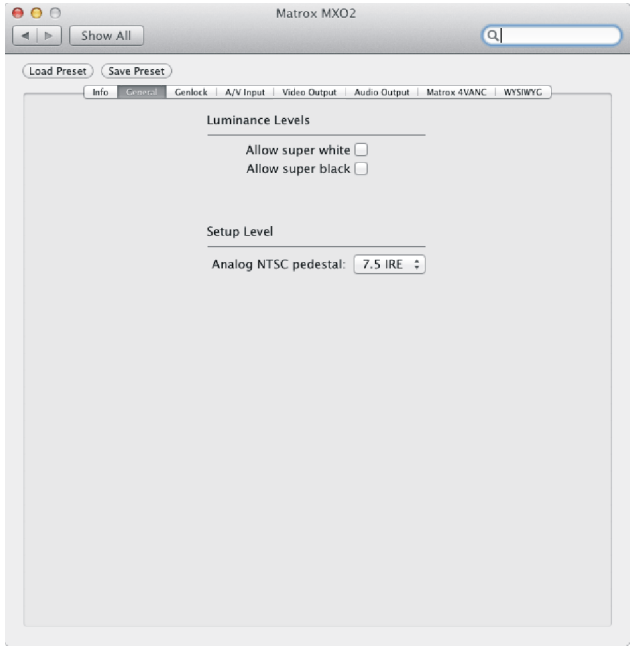
2 Click **Load Preset**, select the custom preset file (*.plist*) that you want to load, and then click **Open**.

Specifying your general settings

You can specify general settings for working with Matrox MXO2. These settings are applied to the MXO2 video inputs and outputs.

1 From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** or **Matrox MXO2 Mini** icon.

2 Click **General**.



3 Under **Luminance Levels**, select **Allow super white** to allow the highest luminance level of your video to exceed the standard maximum white level. Select **Allow super black** to allow the lowest luminance level of your video to fall below the standard black level.

Note Super white and super black should not be allowed when producing your final video production for broadcast.

4 Under **Setup Level**, select the pedestal setting that you want for your NTSC analog video from the **Analog NTSC pedestal** menu:

– **7.5 IRE** Applies the standard NTSC pedestal of 7.5 IRE.

– **0 IRE** Applies a pedestal of 0 IRE. You should select this option when working with a commercial DV device that uses the Japanese analog NTSC pedestal of 0 IRE. For example, if the video appears too bright when you play back DV clips on your NTSC monitor, you can change the pedestal to 0 IRE to output your DV clips at the correct brightness.

Note If your device has a different NTSC pedestal for input and output, you can switch the pedestal setting as needed before capturing or recording to tape.

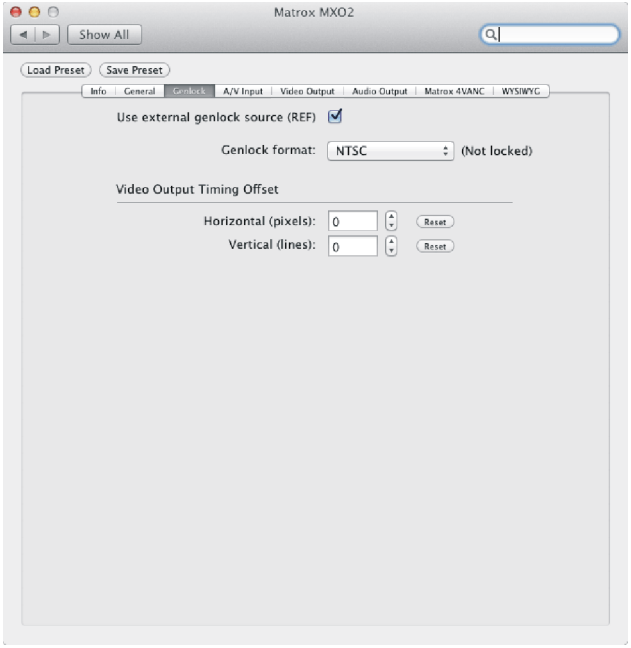
Specifying your genlock settings

Note This section does not apply to Matrox MXO2 Mini.

You can select the source to which you want to genlock all devices connected to your MXO2 system, as well as adjust the timing offset for all MXO2 video outputs.

1 From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** icon.

2 Click **Genlock**.



3 Select **Use external genlock source (REF)** if you connected an external analog genlock source to MXO2's **REF/REF IN** connector, such as a bi-level analog black burst for SD or a tri-level sync for HD. If you don't have an external genlock source connected to MXO2, clear this option to

genlock to MXO2's internal reference signal during playback, and genlock to your capture source during capture (see "Specifying your A/V input settings" on page 57).

Remarks

- When capturing RGB material from a DVI source using MXO2's HDMI input, you must use an external genlock source.
- When capturing video with digital closed captioning (see "Matrox 4VANC capture and playback" on page 70), you must genlock to your capture source and not an external genlock source. Clear this option to genlock to your capture source.

To indicate whether or not MXO2 is presently locked to your external genlock source, the status will be displayed next to the **Genlock format** menu as **Locked** or **Not locked**.

4 From the **Genlock format** menu, select the video format of your external genlock source.

Important To ensure good output results, make sure that your genlock source's video format is compatible with the MXO2 video output format.

5 Use the horizontal and vertical settings under **Video Output Timing Offset** to adjust the timing of the video output relative to your external genlock source. This lets you compensate for cable delays within your system.

Specifying your A/V input settings

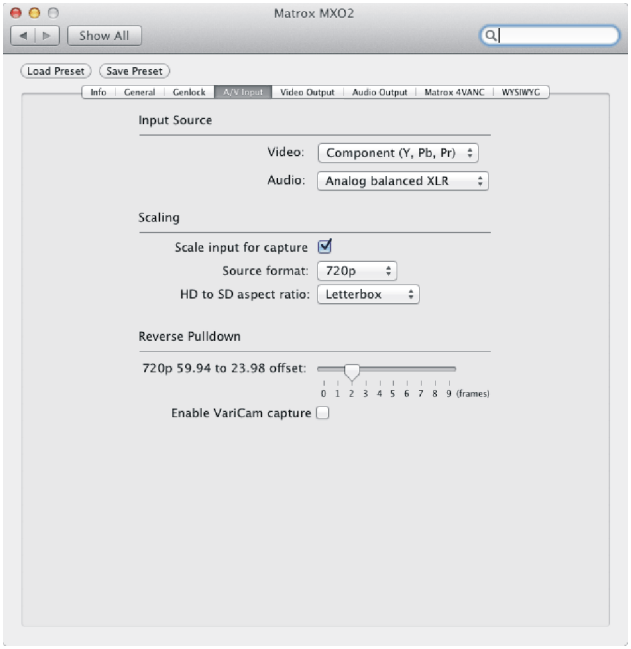
This section specifies the A/V input settings for Matrox MXO2, MXO2 Rack, and MXO2 LE. For MXO2 Mini, see "Specifying your A/V input settings (MXO2 Mini)" on page 60.

You can select the MXO2 video and audio inputs to be used as your capture source. Only one video and audio input source can be used at a time. You can also capture your video to a different format than your source video by enabling scaling on the input. For descriptions of the MXO2 inputs, see "Inputs" on page 144. For a list of the input and capture formats that are supported on MXO2, and to view the MXO2 input scaling options, see Appendix C, "Matrox MXO2 Supported Input and Capture Formats."

Note The HDMI video input does not support SD video for capture. When capturing RGB material from a DVI source using MXO2's HDMI input, you must use an external genlock source (see "Specifying your genlock settings" on page 56).

1 From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** icon.

2 Click **A/V Input**.



3 Under **Input Source**, select the type of input that you want to capture for **Video** and **Audio**.

Remarks

– The **SDI embedded audio** option can be used with the **SDI** video input option only.

– When capturing from an HDMI source, only uncompressed embedded audio is supported.

4 If the format to which you want to capture does not match the format of your source video, select **Scale input for capture**, and then specify your source video's format (see step 5). MXO2 will either upscale, downscale, or cross-convert to the desired capture format. For example, select **Scale input for capture** if your source video is 720p at 59.94 fps and you want to capture to 1080i at 29.97 fps. For a list of the input and capture formats that are supported on MXO2, and to view the MXO2 input scaling options, see Appendix C, "Matrox MXO2 Supported Input and Capture Formats."

Note If **Scale input for capture** is not selected, your capture format must match your source video's format. However, if you want to capture 720p at 23.98 fps video from a 720p at 59.94 fps source (MXO2 input), scaling on the input is not required, but you must specify a frame offset value (see step 7).

5 If you selected **Scale input for capture** in step 4, select the format of your source video (MXO2 input) from the **Source format** list:

Note Depending on the input type selected in step 3, some options may not be available.

- **SD 4:3** Select this option for standard 4:3 NTSC or PAL video. When upscaling to HD, the video is captured in pillarbox format.
- **SD 16:9** Select this option for widescreen 16:9 NTSC or PAL video. When upscaling to HD, the video is captured in anamorphic format.
- **720p** Select this option for 720p video.
- **1080** Select this option for 1080 video.

6 From the **HD to SD aspect ratio** menu, select the aspect ratio conversion option to be used when capturing to SD from an HD video source:

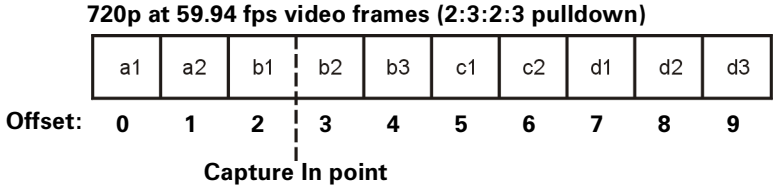
- **Letterbox** Captures the widescreen 16:9 picture as letterbox video by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.
- **Center cut** Captures the widescreen 16:9 picture for display on a standard 4:3 television screen by evenly cropping the left and right edges of the picture.
- **Anamorphic** Captures the widescreen 16:9 picture as horizontally compressed 4:3 video, which retains the picture's full vertical resolution for display on a widescreen television. To display the video with the correct proportions on an NTSC or PAL monitor, select the 16:9 display setting on the monitor.

7 If you're capturing 720p at 23.98 fps video from a 720p at 59.94 fps source that was originally acquired using a standard 2:3:2:3 pulldown, MXO2 performs a reverse 2:3:2:3 pulldown to reconstruct the original 23.98 fps video. For MXO2 to do so, you must specify where your capture In point is relative to the start of the pulldown sequence using the **720p 59.94 to 23.98 offset** slider.

Important If capturing 720p at 23.98 VariCam material, you don't need to specify your capture In point. However, you must select the **Enable VariCam capture** option as explained in step 8.

In the following example, the capture In point is at the fourth frame of the sequence, therefore the frame offset value is 3.

Note If you're performing an open-ended capture without a specified In point, you may need to try different offset values before getting the desired result.



8 If using MXO2's SDI input to capture Panasonic VariCam 720p at 23.98 material, that is output at 720p at 59.94 by your VariCam device, select **Enable VariCam capture**. MXO2 will remove the redundant (filler) frames from the VariCam input during capture and reconstruct the original 720p at 23.98 video.

Note To capture VariCam material, you must select **SDI** as your video input source (see "Specifying your A/V input settings" on page 57).

Specifying your A/V input settings (MXO2 Mini)

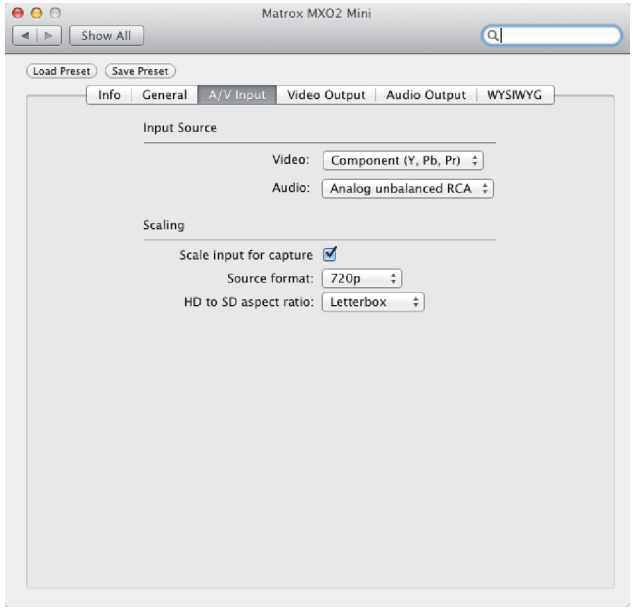
This section specifies the A/V input settings for Matrox MXO2 Mini. For MXO2, MXO2 Rack, or MXO2 LE, see "Specifying your A/V input settings" on page 57.

You can select the MXO2 Mini video and audio inputs to be used as your capture source. Only one video and audio input source can be used at a time. You can also capture your video to a different format than your source video by enabling scaling on the input. For descriptions of the MXO2 Mini inputs, see "Inputs" on page 144. For a list of the input and capture formats that are supported on MXO2 Mini, and to view the MXO2 Mini input scaling options, see Appendix C, "Matrox MXO2 Supported Input and Capture Formats."

Note The HDMI video input does not support SD video for capture.

1 From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2 Mini** icon.

2 Click **A/V Input**.



3 Under **Input Source**, select the type of input that you want to capture for **Video** and **Audio**.

4 If the format to which you want to capture does not match the format of your source video, select **Scale input for capture**, and then specify your source video's format (see step 5). MXO2 Mini will either upscale, downscale, or cross-convert to the desired capture format. For example, select **Scale input for capture** if your source video is 720p at 59.94 fps and you want to capture to 1080i at 29.97 fps. For a list of the input and capture formats that are supported on MXO2 Mini, and to view the MXO2 Mini input scaling options, see Appendix C, "Matrox MXO2 Supported Input and Capture Formats."

Note If **Scale input for capture** is not selected, your capture format must match your source video's format.

5 If you selected **Scale input for capture** in step 4, select the format of your source video (MXO2 input) from the **Source format** list:

Note Depending on the input type selected in step 3, some options may not be available.

– **SD 4:3** Select this option for standard 4:3 NTSC or PAL video. When upscaling to HD, the video is captured in pillarbox format.

- **SD 16:9** Select this option for widescreen 16:9 NTSC or PAL video. When upscaling to HD, the video is captured in anamorphic format.
- **720p** Select this option for 720p video.
- **1080** Select this option for 1080 video.

6 From the **HD to SD aspect ratio** menu, select the aspect ratio conversion option to be used when capturing to SD from an HD video source:

- **Letterbox** Captures the widescreen 16:9 picture as letterbox video by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.
- **Center cut** Captures the widescreen 16:9 picture for display on a standard 4:3 television screen by evenly cropping the left and right edges of the picture.
- **Anamorphic** Captures the widescreen 16:9 picture as horizontally compressed 4:3 video, which retains the picture's full vertical resolution for display on a widescreen television. To display the video with the correct proportions on an NTSC or PAL monitor, select the 16:9 display setting on the monitor.

Specifying your video output settings

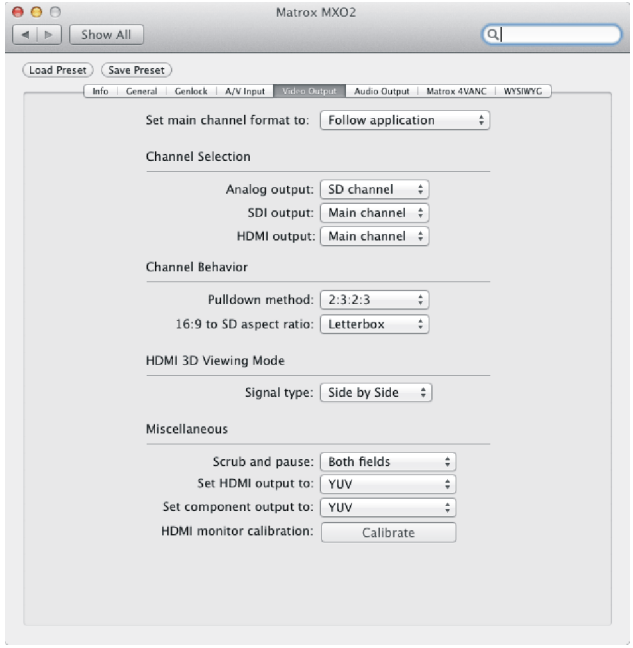
This section specifies the video output settings for Matrox MXO2, MXO2 Rack, and MXO2 LE. For MXO2 Mini, see "Specifying your video output settings (MXO2 Mini)" on page 66.

MXO2 features simultaneous video outputs that allow you to send your video to a variety of devices at the same time. MXO2 provides two separate video output channels to choose from: main channel and SD channel. The video output settings allow you to set the main channel's video format, assign a video channel to an MXO2 output, and define the channel's behavior. You can also select other settings such as the scrub and pause method, and calibrate your HDMI monitor for video.

For a list of the supported video output formats for the MXO2 main and SD channels, and the supported video formats for the MXO2 outputs, see Appendix D, "Matrox MXO2 Supported Output Formats."

1 From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** icon.

2 Click **Video Output**.



3 From the **Set main channel format to** menu, you can select the video output format that you want for the MXO2 main channel. For a list of the supported video output formats for the MXO2 main and SD channels, see "Supported main and SD video output formats" on page 166.

- **Follow application** Sets the main channel's video output to match your project's video format, or to a compatible format for your project. For example, if your project's video format is NTSC, the MXO2 main channel will be set to NTSC as well. If your project's video format is 720p at 23.98 fps, the MXO2 main channel will be set to the compatible 720p at 59.94 fps output format.
- **486p/576p** Sets the main channel's video output to either 486p or 576p, depending on your project's video frame rate. For example, a 720p at 23.98 fps project will be output as 486p, and a 720p at 25 fps project will be output as 576p.
- **720p** Sets the main channel's video output to 720p at a frame rate compatible with your project's video frame rate.
- **1080** Sets the main channel's video output to a 1080i, 1080PsF, or 1080p format, depending on your project's video format.
- **1080i 29.97 from 23.98** Use this option when your project's video format has a frame rate of 23.98 fps, and you want to set the main

channel's video output to 1080i at 29.97 fps (a pulldown will be applied to the video output).

Note When a pulldown is required to convert 23.98 fps video for output, you can select the pulldown method that you want to use (see step 5).

4 Under **Channel Selection**, select the video channel (main or SD) that you want for your MXO2 analog (composite, S-Video, and component), SDI, and HDMI outputs:

- **Main channel** Outputs your project's video as defined for the main channel (see step 3).
- **SD channel** Outputs your project's video as NTSC or PAL, depending on your project's video output frame rate.

5 Under **Channel Behavior**, select the **Pulldown method** that is applied to the video output when converting 23.98 fps to 29.97 fps or 59.94 fps (see "Supported main and SD video output formats" on page 166). In all other instances, this option does not apply. For information on the available pulldown methods, see Appendix A, "Understanding Pulldown."

6 Under **Channel Behavior**, select the **16:9 to SD aspect ratio** conversion option to be used when downconverting 16:9 material to SD, or when outputting SD 16:9 material:

- **Letterbox** Outputs the widescreen 16:9 picture in letterbox mode by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.
- **Center cut** Outputs the widescreen 16:9 picture by evenly cropping the left and right edges of the picture for display on a standard 4:3 television screen.
- **Anamorphic** Outputs the widescreen 16:9 picture as horizontally compressed 4:3 video, which retains the picture's full vertical resolution for display on a widescreen television. To display the video with the correct proportions on an NTSC or PAL monitor, select the 16:9 display setting on the monitor.

7 Under **HDMI 3D Viewing Mode**, select the 3D **Signal type** that will be sent to your 3D monitor via MXO2's HDMI output. This option signals your 3D monitor to automatically switch to the selected 3D viewing mode. You must select the signal type that matches the 3D video that you want to output, or disable this option.

- **Disabled** Select this if you're not outputting 3D video, or to disable this option. You can still monitor 3D video, but you must select the correct viewing mode on your 3D monitor manually.
- **Side by Side** Select this for horizontally-compressed side-by-side 3D video (also referred to as side-by-side horizontal).

- **Over/Under** Select this for over/under 3D video (also referred to as top bottom).

Note This feature may not be supported on some 3D monitors.

8 Under **Miscellaneous**, select **First field**, **Second field**, or **Both fields** from the **Scrub and pause** menu to indicate whether you want to display both fields or only one field when pausing video playback or scrubbing the timeline in your project. For example, you may want to scrub the first or second field to eliminate the flickering that can be seen in your picture when you pause while scrubbing interlaced video.

9 From the **Set HDMI output to** menu, select the type of video signal that you want to be sent from the HDMI output:

- **YUV** Outputs YUV HDMI video. Select this only if you connected the HDMI output to a device that accepts a YUV signal.
- **RGB - calibrated** Outputs adjusted RGB HDMI video using the currently loaded Matrox HDMI calibration settings for your HDMI monitor or television. For details on calibrating your HDMI monitor and loading HDMI calibration settings using the Matrox HDMI Calibration Utility, see Chapter 8, "Calibrating Your HDMI Monitor for Video."
- **RGB - native** Outputs native RGB HDMI video that does not apply any calibration compensation. This is useful when you want to output RGB HDMI video to a device other than an HDMI monitor or television, such as an HDMI recorder to perform an export to tape.

10 From the **Set component output to** menu, select **YUV** or **RGB** to set the type of video that is sent from MXO2's component (Y, Pb, Pr) output. For example, select **RGB** if your MXO2's component output is connected to a device that accepts an RGB signal.

11 Click the **Calibrate** button to calibrate your HDMI monitor or load HDMI calibration settings using the Matrox HDMI Calibration Utility (see Chapter 8, "Calibrating Your HDMI Monitor for Video").

Note In order to run the Matrox HDMI Calibration Utility, the HDMI output type must be set to **RGB - calibrated** (see step 9).

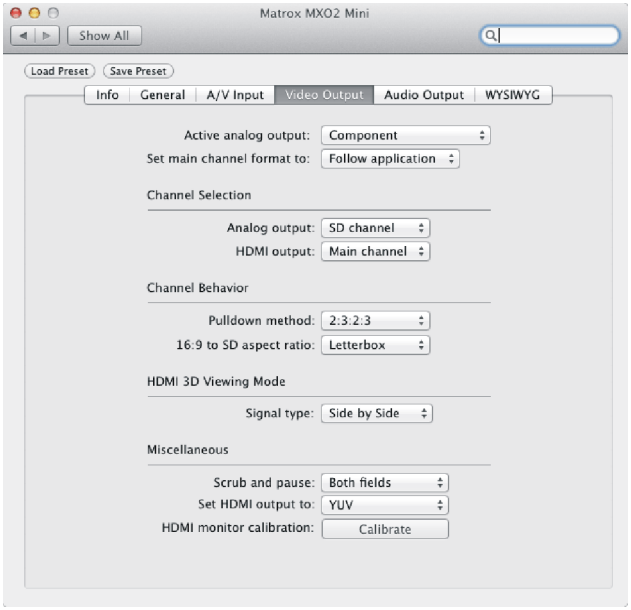
Specifying your video output settings (MXO2 Mini)

This section specifies the video output settings for Matrox MXO2 Mini. For other MXO2 products, see "Specifying your video output settings" on page 62.

MXO2 Mini features simultaneous video outputs that allow you to send your video to a variety of devices at the same time. MXO2 Mini provides two separate video output channels to choose from: main channel and SD channel. The video output settings allow you to set the main channel's video format, assign a video channel to an MXO2 Mini output, and define the channel's behavior. You can also select other settings such as the scrub and pause method, and calibrate your HDMI monitor for video.

For a list of the supported video output formats for the MXO2 Mini main and SD channels, and the supported video formats for the MXO2 Mini outputs, see Appendix D, "Matrox MXO2 Supported Output Formats."

1. From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2 Mini** icon.
2. Click **Video Output**.



3. From the **Active analog output** menu, select the type of connection that you want to use for MXO2 Mini's Y, Pb, and Pr output connectors (see "Outputs" on page 151).

Note When you connect an analog component device to MXO2 Mini, you won't be able to connect an S-Video or composite device at the same time. If you're outputting HD analog component video, the composite and S-Video outputs will be invalid.

4 From the **Set main channel format to** menu, you can select the video output format that you want for the MXO2 Mini main channel. For a list of the supported video output formats for the MXO2 Mini main and SD channels, see "Supported main and SD video output formats" on page 166.

- **Follow application** Sets the main channel's video output to match your project's video format, or to a compatible format for your project. For example, if your project's video format is NTSC, the MXO2 main channel will be set to NTSC as well. If your project's video format is 720p at 23.98 fps, the MXO2 main channel will be set to the compatible 720p at 59.94 fps output format.
- **486p/576p** Sets the main channel's video output to either 486p or 576p, depending on your project's video frame rate. For example, a 720p at 23.98 fps project will be output as 486p, and a 720p at 25 fps project will be output as 576p.
- **720p** Sets the main channel's video output to 720p at a frame rate compatible with your project's video frame rate.
- **1080** Sets the main channel's video output to a 1080i, 1080PsF, or 1080p format, depending on your project's video format.

5 Under **Channel Selection**, select the video channel (main or SD) that you want for your MXO2 Mini analog (composite, S-Video, and component) and HDMI outputs:

- **Main channel** Outputs your project's video as defined for the main channel (see step 4).
- **SD channel** Outputs your project's video as NTSC or PAL, depending on your project's video output frame rate.

6 Under **Channel Behavior**, select the **Pulldown method** that is applied to the video output when converting 23.98 fps to 29.97 fps or 59.94 fps (see "Supported main and SD video output formats" on page 166). In all other instances, this option does not apply. For information on the available pulldown methods, see Appendix A, "Understanding Pulldown."

7 Under **Channel Behavior**, select the **16:9 to SD aspect ratio** conversion option to be used when downconverting 16:9 material to SD, or when outputting SD 16:9 material:

- **Letterbox** Outputs the widescreen 16:9 picture in letterbox mode by adding black bars at the top and bottom of the picture for display on a standard 4:3 television screen.

- **Center cut** Outputs the widescreen 16:9 picture by evenly cropping the left and right edges of the picture for display on a standard 4:3 television screen.
- **Anamorphic** Outputs the widescreen 16:9 picture as horizontally compressed 4:3 video, which retains the picture's full vertical resolution for display on a widescreen television. To display the video with the correct proportions on an NTSC or PAL monitor, select the 16:9 display setting on the monitor.

8 Under **HDMI 3D Viewing Mode**, select the 3D **Signal type** that will be sent to your 3D monitor via MXO2 Mini's HDMI output. This option signals your 3D monitor to automatically switch to the selected 3D viewing mode. You must select the signal type that matches the 3D video that you want to output, or disable this option.

- **Disabled** Select this if you're not outputting 3D video, or to disable this option. You can still monitor 3D video, however you must select the correct viewing mode on your 3D monitor manually.
- **Side by Side** Select this for horizontally-compressed side-by-side 3D video (also referred to as side-by-side horizontal).
- **Over/Under** Select this for over/under 3D video (also referred to as top bottom).

Note This feature may not be supported on some 3D monitors.

9 Under **Miscellaneous**, select **First field**, **Second field**, or **Both fields** from the **Scrub and pause** menu to indicate whether you want to display both fields or only one field when pausing video playback or scrubbing the timeline in your project. For example, you may want to scrub the first or second field to eliminate the flickering that can be seen in your picture when you pause while scrubbing interlaced video.

10 From the **Set HDMI output to** menu, select the type of video signal that you want to be sent from the HDMI output:

- **YUV** Outputs YUV HDMI video. Select this only if you connected the HDMI output to a device that accepts a YUV signal.
- **RGB - calibrated** Outputs adjusted RGB HDMI video using the currently loaded Matrox HDMI calibration settings for your HDMI monitor or television. For details on calibrating your HDMI monitor and loading HDMI calibration settings using the Matrox HDMI Calibration Utility, see Chapter 8, "Calibrating Your HDMI Monitor for Video."
- **RGB - native** Outputs native RGB HDMI video that does not apply any calibration compensation. This is useful when you want to output RGB HDMI video to a device other than an HDMI monitor or television, such as an HDMI recorder to perform an export to tape.

11 Click the **Calibrate** button to calibrate your HDMI monitor or load HDMI calibration settings using the Matrox HDMI Calibration Utility (see Chapter 8, "Calibrating Your HDMI Monitor for Video").

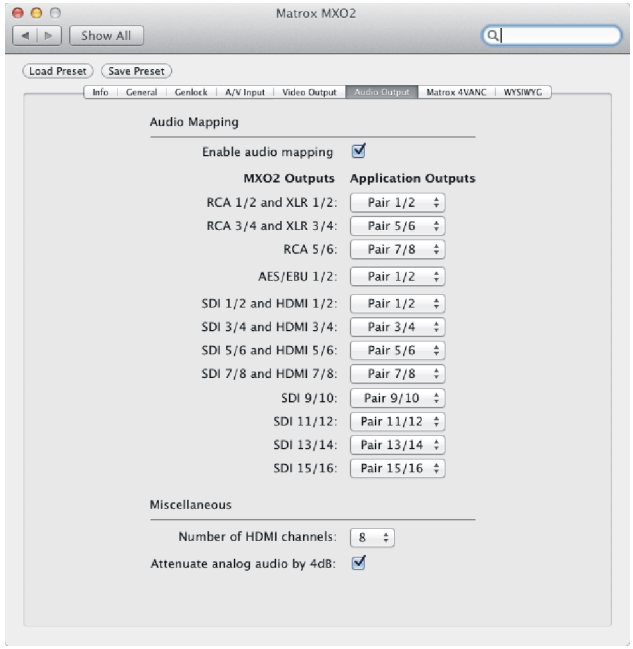
Note In order to run the Matrox HDMI Calibration Utility, the HDMI output type must be set to **RGB - calibrated** (see step 10).

Specifying your audio output settings

MXO2's simultaneous audio outputs allow you to send your audio to a variety of devices at the same time. You can also map any audio track in your video application to any MXO2 audio output. For descriptions of the MXO2 outputs, see "Outputs" on page 151.

1 From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** or **Matrox MXO2 Mini** icon.

2 Click **Audio Output**.



Note The available MXO2 audio outputs depend on your MXO2 hardware.

3 Under **Audio Mapping**, select or clear the **Enable audio mapping** option. If this option is cleared, your application's audio track outputs will be routed to the corresponding MXO2 audio outputs by default. For example, when you output audio tracks as Pair 1/2 from your application, the audio will be routed to the corresponding 1/2 MXO2 audio outputs.

4 If you selected the **Enable audio mapping** option, for each of the MXO2 outputs, select the desired audio pair from your application.

Note If you enable playback of Matrox 4VANC AFD or Matrox 4VANC closed captioning, audio track 15 or 16 will be muted and won't be available for audio playback (see "Matrox 4VANC capture and playback" on page 70).

5 Under **Miscellaneous**, select the **Number of HDMI channels** that you want to output from MXO2's HDMI output. This option is especially useful for HDMI monitors that don't accept more than two audio channels. If you choose to output two audio channels, MXO2 will output the audio pair mapped to **HDMI 1/2**.

6 Select **Attenuate analog audio by 4dB** to decrease the level of the audio that is output from the MXO2 analog outputs by 4dB.

Matrox 4VANC capture and playback

Note Matrox 4VANC capture and playback is available on Matrox MXO2, MXO2 Rack, and MXO2 LE only.

The Matrox 4VANC tool lets you capture and play back AFD (active format description) and digital closed caption data, along with your video, using audio tracks 15 and 16, respectively. This section describes Matrox 4VANC, as it applies to AFD and closed captioning, and details how to enable these features on MXO2.

Matrox 4VANC AFD capture and playback

Note Matrox 4VANC AFD is available on Matrox MXO2, MXO2 Rack, and MXO2 LE only.

If you have an SDI video source that contains AFD (active format description) data in the VANC (vertical ancillary data space), Matrox 4VANC lets you preserve the data during capture, maintain the data during playback and export to disk, and restore the data during output. When using a video application such as Final Cut Pro or Matrox Vetura Capture, Matrox 4VANC captures the AFD data as an audio track using MXO2's SDI input, along with the video. The Matrox 4VANC audio track that contains the AFD data can then be used in a video application, such as Final Cut Pro or Matrox Vetura Playback (see Chapter 11, "Using Matrox Vetura Capture and Vetura Playback"), to play back the AFD data through MXO2's SDI output.

Matrox 4VANC preserves the SDI VANC AFD data during capture by encoding the data into the audio stream using audio track 15. The resulting file is an uncompressed 24-bit 48 kHz audio file that contains the AFD data. When using MXO2's SDI input for capture, you can choose to use audio track 15 to preserve the AFD data that is in your source video's VANC. Because audio track 15 is

used for capturing AFD data, that channel will not be available for capturing audio.

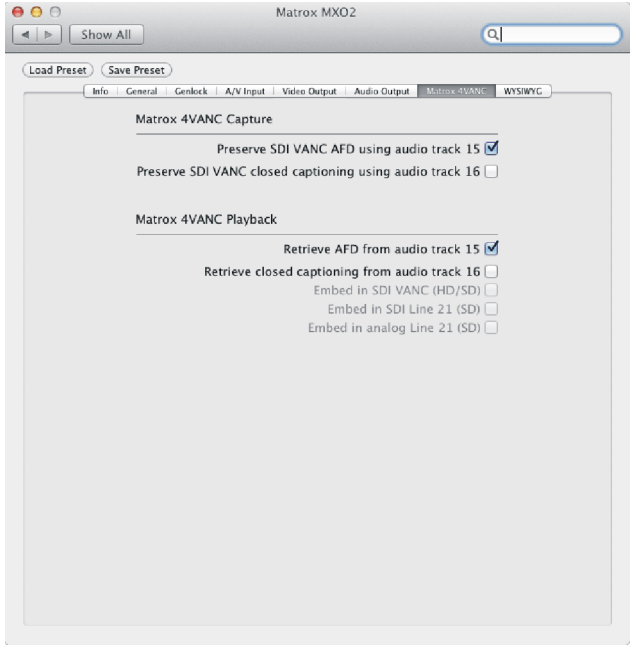
When using MXO2's SDI output for playback, you can choose to retrieve and output the Matrox 4VANC AFD data from your video application. The AFD data is retrieved from audio track 15 and output using MXO2's SDI output. The AFD data is restored to your HD/SD video's VANC on output. When Matrox 4VANC is being used, track 15 is muted during playback, therefore it will not be available for playing back audio.

The next section describes how to enable Matrox 4VANC AFD for capture and playback on MXO2.

Enabling AFD capture and playback

1 From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** icon.

2 Click **Matrox 4VANC**.



3 Under **Matrox 4VANC Capture**, select **Preserve SDI VANC AFD using audio track 15** to capture the AFD data from your source video's VANC using SDI audio track 15.

Note To capture AFD data, you must select **SDI** as your video input source (see "Specifying your A/V input settings" on page 57). You must also genlock

to your capture source and not an external genlock source (see "Specifying your genlock settings" on page 56).

4 Under **Matrox 4VANC Playback**, select **Retrieve AFD from audio track 15** to retrieve the Matrox 4VANC AFD data from audio track 15 in your video application, and play back the video with the AFD data restored to the VANC using MXO2's SDI output.

5 Specify the appropriate settings in your video application. For information on how to set your Final Cut Pro settings to capture, play back, and export Matrox 4VANC AFD, see "Specifying settings for Matrox 4VANC AFD" on page 90.

Matrox 4VANC closed caption capture and playback

Note Matrox 4VANC closed caption is available on Matrox MXO2, MXO2 Rack, and MXO2 LE only.

If you have an SDI video source that contains digital closed caption data in the VANC (vertical ancillary data space), Matrox 4VANC lets you capture the closed caption data as an audio track using MXO2's SDI input, along with the video. The Matrox 4VANC audio track that contains the closed caption data can then be used in a video application, such as Final Cut Pro or Matrox Vetura Playback (see Chapter 11, "Using Matrox Vetura Capture and Vetura Playback"), to play back closed captioning through MXO2's SDI or analog output.

Matrox 4VANC preserves the SDI VANC closed caption data during capture by encoding the data into the audio stream using audio track 16. The resulting file is an uncompressed 24-bit 48 kHz audio file that contains the closed caption data. You can also create a Matrox 4VANC closed caption audio file using supported captioning software, such as CPC MacCaption. You can add a Matrox 4VANC closed caption audio file to any project timeline in your video application, or transport and store the audio file on any video/audio device as an audio track.

When using MXO2's SDI input for capture, you can choose to use audio track 16 to preserve the closed caption data that is in your source video's VANC. Because audio track 16 is used for capturing closed captioning, that channel will not be available for capturing audio.

Note Closed caption data that is present in line 21 of a video's VBI (vertical blanking interval) is not transferred to an audio track because it is captured by MXO2 as part of the video signal.

When using MXO2's SDI or analog output for playback, you can choose to retrieve and output the Matrox 4VANC closed caption data from your video application. The closed caption data is retrieved from audio track 16 and output using MXO2's SDI or analog output. When Matrox 4VANC is being used, track

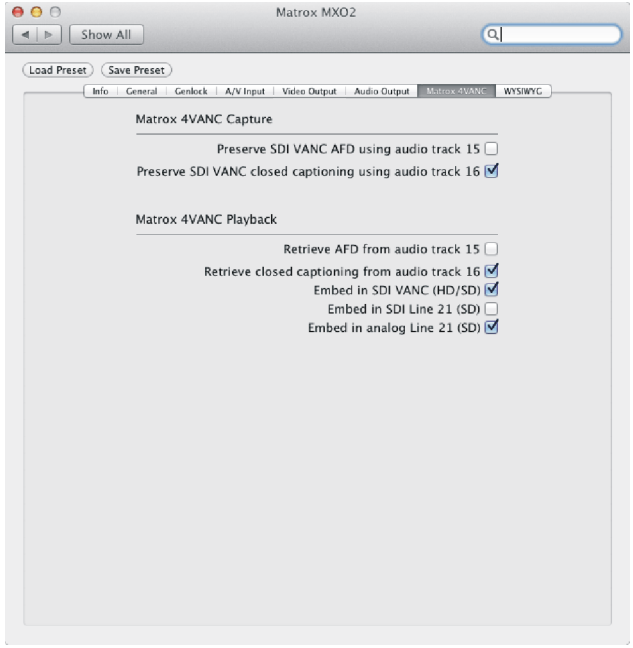
16 is muted during playback, therefore it will not be available for playing back audio. For playback, MXO2 lets you choose whether to embed the closed caption data in your HD/SD video's VANC, or in Line 21 of the VBI portion of SD video.

The next section describes how to enable Matrox 4VANC closed captioning for capture and playback on MXO2.

Enabling closed caption capture and playback

1 From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** icon.

2 Click **Matrox 4VANC**.



3 Under **Matrox 4VANC Capture**, select **Preserve SDI VANC closed Captioning using audio track 16** to capture the digital closed caption data from your source video's VANC using SDI audio track 16.

Note To capture digital closed captioning, you must select **SDI** as your video input source (see "Specifying your A/V input settings" on page 57). You must also genlock to your capture source and not an external genlock source (see "Specifying your genlock settings" on page 56).

4 Under **Matrox 4VANC Playback**, select **Retrieve closed captioning from audio track 16** to retrieve the Matrox 4VANC closed caption data from track 16 in your video application, and play back the video with closed captioning using MXO2's SDI or analog output.

5 If you selected **Retrieve closed captioning from audio track 16** in step 4, specify where you want the closed captioning data to be embedded in the video signal during playback. Since MXO2 features simultaneous outputs, you can select more than one of the following options.

- **Embed in SDI VANC (HD/SD)** Use this option if you want to play back HD or SD video from MXO2's SDI output, and embed the closed captioning data in your video's VANC.
- **Embed in SDI Line 21 (SD)** Use this option if you want to play back SD video from MXO2's SDI output, and embed the closed captioning data on Line 21 of the VBI (vertical blanking interval) portion of your video signal.
- **Embed in analog Line 21 (SD)** Use this option if you want to play back SD video from any of MXO2's analog outputs (component, S-Video, and composite), and embed the closed captioning data on Line 21 of the VBI (vertical blanking interval) portion of your video signal.

Note To preview HD video with closed captioning on an SD monitor, you must set the output that is connected to your monitor to SD (see "Specifying your video output settings" on page 62), and select either **Embed in SDI Line 21 (SD)** or **Embed in analog Line 21 (SD)**.

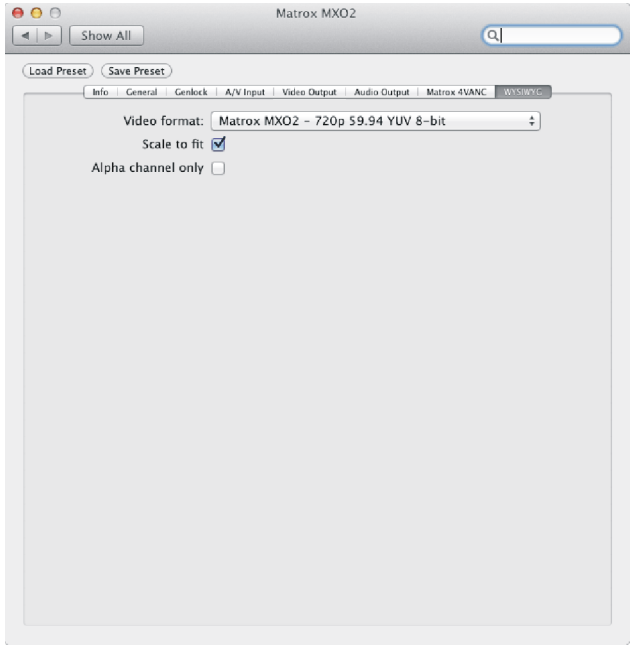
6 Specify the appropriate settings in your video application. For information on how to set your Final Cut Pro settings to capture, play back, and export Matrox 4VANC closed captioning, see "Specifying settings for Matrox 4VANC closed captioning" on page 88. For information on how to set your Matrox Vetura Playback settings to play back a video file (*.mov*) with Matrox 4VANC closed captioning that was exported to disk, see Chapter 11, "Using Matrox Vetura Capture and Vetura Playback."

Specifying your Matrox WYSIWYG settings

The Matrox WYSIWYG settings configure the MXO2 video output when working with Adobe After Effects and Photoshop only (see Chapter 9, "Using Matrox MXO2 with Supported Programs").

1 From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** icon.

2 Click **WYSIWYG**.



3 From the **Video Format** list, select the format that you want for your video output. This sets the size of the canvas on which your composition/image is outputted. You can select the format that matches your composition/image, or you can select a different format, such as to monitor an NTSC composition/image on an HD canvas. Also, if you're using an HDMI monitor that does not support 1:1 pixel mapping, select your monitor's native resolution as the video format to view a 1:1 representation of your composition/image.

Important To avoid unintended output results when working with Matrox WYSIWYG, we recommend that you set the MXO2 main channel to **Follow application**, and make sure that the MXO2 output that you will use for monitoring is set to output the main channel (see "Specifying your video output settings" on page 62, or "Specifying your video output settings (MXO2 Mini)" on page 66).

4 If the selected **Video format** does not match your composition/image, select **Scale to fit** to upscale/downscale your project to fit the selected video format.

5 If your project contains an alpha channel, Matrox outputs either the alpha channel or image channel at any one time. Select **Alpha channel only** to

output the alpha channel from your project, or clear the option to output the image channel.

Viewing MXO2 information

To view your MXO2's serial number, firmware version, and software version:

1. From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** or **Matrox MXO2 Mini** icon.
2. Click **Info**.

Note If a message appears indicating an unsupported firmware version on your MXO2 hardware, you must update the MXO2 firmware as explained in "Updating your MXO2 firmware" on page 10.

MXO2 core audio support

You can use MXO2 as the input and output audio device for your Mac OS, and any audio application on your system. The **Matrox MXO2 Audio Input** and **Matrox MXO2 Audio Output** audio device options allow you to set MXO2 as the input and output audio device in your Mac OS **Sound** settings for your entire system, for use with such applications as Apple iTunes. You can also set MXO2 as the input and output audio device within specific audio applications on your system, such as Apple Soundtrack Pro.

The following provides details for using MXO2 as your audio device:

Capture

If you want to perform a capture in an application that has MXO2 as the audio device, you must close any other application that has MXO2 selected as the audio device before capturing.

Playback

- You can simultaneously output audio from any of the following QuickTime-based applications when using MXO2 as the audio device:
  - Apple Final Cut Pro
  - Apple QuickTime Player
  - Apple iTunes
  - Apple GarageBand
  - Apple Soundtrack Pro

Note When using Apple QuickTime Player or Apple Garageband with any non-QuickTime application, you must close the current application before using MXO2 as the audio device in another application.

- When using any of the following non-QuickTime applications with any other application (QuickTime-based or not), you must stop playback in the current application before using MXO2 as the audio device in another application. You cannot output audio using MXO2 as the audio device from more than one of the following applications at a time:
  - Avid Media Composer
  - Adobe Premiere Pro
  - Adobe After Effects
  - Matrox Vetura Playback
- If you encounter audio issues when using MXO2 as your audio device, make sure that only one application that is using MXO2 as the audio device is running at any given time, or if applicable, remove MXO2 as the audio device in your Mac OS **Sound** settings.

Your notes

8

Calibrating Your HDMI Monitor for Video

This chapter explains how to use the Matrox HDMI Calibration Utility to calibrate your RGB HDMI monitor for video.

Overview

The Matrox HDMI Calibration Utility is a unique tool designed to calibrate your RGB HDMI monitor or television so that it performs like a traditional broadcast video monitor. This utility provides a wizard that walks you through the calibration process using specially designed patterns to effectively identify and compensate for the processing errors that may be present in your HDMI monitor. The Matrox HDMI Calibration Utility calibrates your monitor's black and white levels, white point, gamma response, and hue and chroma.

This utility is optimized for calibrating HDMI LCD/LED monitors or televisions that support 1:1 pixel mapping, which allows you to view the output on your HDMI monitor at its exact resolution without any scaling. Although instructions are provided for calibrating plasma HDMI monitors, and HDMI monitors that scale the output, a blue-only filter will be required for the color calibration (hue and chroma). Some HDMI monitors feature a built-in blue-only mode that you can use for color calibration. If your HDMI monitor does not have a built-in blue-only mode, you can use a proper third-party blue-only filter (for example, a blue gel filter, or blue-only calibration glasses) that completely blocks out all colors except for blue. Because some blue-only filters do not block out colors effectively, the Matrox HDMI Calibration Utility includes a blue-only filter test that you can use to determine if your blue-only filter is adequate for color calibration.

Note This utility is best viewed at a display resolution of 1280×800 or higher.

Calibrating your HDMI monitor

The Matrox HDMI Calibration Utility provides on-screen instructions to calibrate your HDMI monitor. At the end of the calibration process, you must save your calibration settings to a file. Once saved, the calibration settings are automatically loaded as your system's current calibration settings. If you're calibrating more than one HDMI monitor, you can calibrate and save settings for each monitor and load the corresponding settings at any time (see "Loading Matrox HDMI calibration settings" on page 81). You can later choose to enable or disable the loaded calibration settings (see "Enabling and disabling the Matrox HDMI calibration settings" on page 82).

Note An administrator username and password is required to calibrate your HDMI monitor.

1. Ensure that your HDMI monitor is connected to MXO2's HDMI output, turn the HDMI monitor on, and allow it to warm up for about 20 or 30 minutes.
2. From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** or **Matrox MXO2 Mini** icon.
3. Click **Video Output**.

4 Under **Miscellaneous**, from the **Set HDMI output to** list, select **RGB - calibrated**.

5 Click **Calibrate**, enter an administrator username and password, and follow the on-screen instructions to calibrate your HDMI monitor.

Note When the Matrox HDMI Calibration Utility is running, you will not have access to the MXO2 options in the MXO2 preferences window, and the MXO2 inputs and outputs will not be available to any other application.

6 When prompted at the end of the calibration process, save your calibration settings to a file anywhere on your system. Once saved, your settings are automatically loaded as your system's current calibration settings. You can later choose to enable or disable the loaded calibration settings (see "Enabling and disabling the Matrox HDMI calibration settings" on page 82).

Note The calibration settings file is saved as a *.plist* file. If you cancel the HDMI calibration, or close the utility at any time before saving the calibration settings, the current calibration settings will be lost.

Loading Matrox HDMI calibration settings

After calibrating your HDMI monitor and saving your calibration settings to a file (see "Calibrating your HDMI monitor" on page 80), the calibration settings are automatically loaded as the current HDMI calibration settings for your system. You can, however, load another HDMI calibration settings file at any time, but only one calibration settings file can be loaded for your system at any given time. Once loaded, you can enable or disable the calibration settings (see "Enabling and disabling the Matrox HDMI calibration settings" on page 82). If your system has multiple users, the loaded calibration settings apply to all users.

Note An administrator username and password is required to load HDMI calibration settings.

1 From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** or **Matrox MXO2 Mini** icon.

2 Click **Video Output**.

3 Under **Miscellaneous**, from the **Set HDMI output to** list, select **RGB - calibrated**.

4 Click **Calibrate**, enter an administrator username and password, and then click **Load Settings** from the **Welcome** page.

5 Select the desired *.plist* calibration file, and then click **Open**.

Enabling and disabling the Matrox HDMI calibration settings

The HDMI calibration settings that are loaded for your system (see “Loading Matrox HDMI calibration settings” on page 81) can be enabled or disabled. When enabled, the video that is output from the MXO2 HDMI output will have the color settings that are saved in the currently loaded calibration file. This is used when you want to monitor video on your RGB HDMI monitor. Disable the calibration settings if you want the HDMI video to be output from MXO2 with its native color settings, such as when performing an edit-to-tape.

1. From the **Apple** menu, click **System Preferences**, and then click the **Matrox MXO2** or **Matrox MXO2 Mini** icon.
2. Click **Video Output**.
3. Under **Miscellaneous**, from the **Set HDMI output to** list, select **RGB - calibrated** to enable the loaded HDMI calibration settings. Depending on your HDMI output device, select **RGB - native** or **YUV** to disable the loaded calibration settings. For more information on setting the MXO2 HDMI output type, see “Specifying your video output settings” on page 62, or “Specifying your video output settings (MXO2 Mini)” on page 66.

9

Using Matrox MXO2 with Supported Programs

This chapter explains how to define various settings for using all MXO2 products with Final Cut Pro, Premiere Pro, and other supported programs.

Introduction

This chapter provides information on how to configure the following applications for use with MXO2:

- Apple Final Cut Pro
- Apple Color
- Apple Motion
- Adobe Premiere Pro
- Adobe Encore
- Adobe After Effects
- Adobe Photoshop

This chapter also explains how to use your Matrox MXO2 system as an input device to feed video and audio to a live media streaming encoding application.

Important Matrox MXO2 features scaling options that you can use to scale your video for capture and output. To ensure desired results, always scale your video using the MXO2 scaling options (see Chapter 7, "Configuring Your MXO2 System") instead of the scaling options found in your video application.

Working with Apple Final Cut Pro

You can use Final Cut Pro with MXO2 to capture and play back video. MXO2 comes with predefined Easy Setups that you can use to quickly set up your project in Final Cut Pro, or you can create custom Easy Setups for use with MXO2. For a list of the supported video output formats for the MXO2 main and SD channels, and the supported video formats for the MXO2 outputs, see Appendix D, "Matrox MXO2 Supported Output Formats."

This section includes information on how to:

- Use and create MXO2 Easy Setups and presets.
- Configure Final Cut Pro for use with Matrox 4VANC AFD and closed captioning.
- Set your video and audio output device settings in Final Cut Pro.
- Ensure frame-accurate capture and edit-to-tape.

Matrox MXO2 Easy Setups

The Matrox MXO2 QuickTime video output component for Final Cut Pro includes predefined MXO2 Easy Setups that you can load to immediately apply appropriate sequence, capture, device control, and A/V output preset settings for use with MXO2. You can also create a custom MXO2 Easy Setup for Final Cut Pro. For detailed information on Easy Setups, see your Final Cut Pro documentation.

Loading a Matrox MXO2 Easy Setup

1. Open Final Cut Pro and choose **Final Cut Pro > Easy Setup**.
2. From the drop down menu in the **Easy Setup** window, select the Matrox MXO2 Easy Setup that matches the format of your project. For example, if you're working with NTSC material, select **Matrox MXO2 Uncompressed NTSC 10-bit 48kHz**.
3. Click **Setup** to load the settings.
4. For MXO2, MXO2 Rack, and MXO2 LE, to avoid having to render a part of your sequence for playback when working with more than eight audio tracks, set the **Real-Time Audio Mixing** option to **16** in **Final Cut Pro > User Preferences**.

Creating a Matrox MXO2 Easy Setup

1. Open Final Cut Pro and choose **Final Cut Pro > Audio/Video Settings**.
2. On the **Summary** pane, select the settings for your new MXO2 project preset. To be compatible with Matrox MXO2, you must select a **Matrox MXO2** preset for each of the easy setup options (**Sequence Preset**, **Capture Preset**, **Device Control Preset**, **Video Playback**, and **Audio Playback**). To create a new Matrox MXO2 sequence, capture, or device control preset, see "Matrox MXO2 presets" on page 86.
3. Click **Create Easy Setup**.
4. Type a **Name** and **Description**, and then click **Create**.
5. In the **Save** dialog box, save the new MXO2 Easy Setup to a location on your computer.

Important By default, the path is set to */Library/Application Support/Final Cut Pro System Support/Custom Settings*. If you save your Easy Setup somewhere else on your computer, the Easy Setup will not appear in the Easy Setup list, and may be lost if the MXO2 software is re-installed.

6. In the **Audio/Video Settings** window, click **OK**.
7. For MXO2, MXO2 Rack, and MXO2 LE, to avoid having to render a part of your sequence for playback when working with more than eight audio tracks, set the **Real-Time Audio Mixing** option to **16** in **Final Cut Pro > User Preferences**.

Matrox MXO2 presets

You can create a new MXO2 sequence, capture, and device control preset, or edit an existing preset. For detailed information on presets, see your Final Cut Pro documentation.

Creating and editing MXO2 sequence presets

1. Open Final Cut Pro and choose **Final Cut Pro > Audio/Video Settings**.
2. Click the **Sequence Presets** tab.
3. Select the sequence preset that you want to use as a starting point for creating a new preset, or select the sequence preset that you want to edit.
4. Click **Duplicate** to create a new preset, or click **Edit**.

Important If you click **Edit**, the preset that you selected in step 3 will be overwritten.

5. In the **Sequence Preset Editor** window, select your settings. To be compatible with Matrox MXO2, you must select **48 kHz** and **24-bit** under **Audio Settings** on the **General** pane.
6. Type an appropriate **Name** and **Description**.
7. Click **OK**.
8. If you're editing a sequence preset, click **OK** in the **Audio/Video Settings** window to save your edits.

Creating and editing MXO2 capture presets

1. Open Final Cut Pro and choose **Final Cut Pro > Audio/Video Settings**.
2. Click the **Capture Presets** tab.
3. Select the capture preset that you want to use as a starting point for creating a new preset, or select the capture preset that you want to edit.
4. Click **Duplicate** to create a new preset, or click **Edit**.

Important If you click **Edit**, the preset that you selected in step 3 will be overwritten.

5. In the **Capture Preset Editor** window, select your settings. To be compatible with Matrox MXO2, the capture preset must have the following settings:
   - Under **QuickTime Video Settings**, select a Matrox **Digitizer** and **Input** setting that matches the format to which you want to capture. If the capture format does not match the format of your source video that is connected to MXO2's input, you must enable scaling on the input in MXO2 (see "Specifying your A/V input settings" on page 57). For a list of the capture formats that are supported on MXO2, see Appendix C, "Matrox MXO2 Supported Input and Capture Formats."

Note A General Error message may appear when you select the digitizer. If this occurs, you will not be able to set the **Input** option from the **Capture Preset Editor** window. To set the capture input option, close the error message, and under **QuickTime Video Settings**, click **Advanced**. In the **Video** window, click **Source**, select the Matrox MXO2 setting that matches the format to which you want to capture, and then click **OK**.

- Under **QuickTime Audio Settings**, from the **Device** menu, click **Matrox MXO2 Audio Input**.

6. Type an appropriate **Name** and **Description**.
7. Click **OK**.
8. If you're editing a capture preset, click **OK** in the **Audio/Video Settings** window to save your edits.

Creating and editing MXO2 device control presets

Note Matrox MXO2 Mini does not support device control.

A Matrox MXO2 device control preset is required only when using the MXO2 RS-422 serial connector for device control.

1. Open Final Cut Pro and choose **Final Cut Pro > Audio/Video Settings**.
2. Click the **Device Control Presets** tab.
3. Select the device control preset that you want to use as a starting point for creating a new preset, or select the device control preset that you want to edit.
4. Click **Duplicate** to create a new preset, or click **Edit**.

Note If you click **Edit**, the preset that you selected in step 3 will be overwritten.

5. In the **Device Control Preset Editor** window, select your settings. To be compatible with Matrox MXO2, the device control preset must have the following settings:
   - From the **Audio Mapping** menu, click **16 Channels**.
   - From the **Port** menu, click **Matrox MXO2 RS-422 Port**.
6. Type an appropriate **Name** and **Description**.
7. Click **OK**.
8. If you're editing a device control preset, click **OK** in the **Audio/Video Settings** window to save your edits.

Specifying settings for Matrox 4VANC closed captioning

Note Matrox MXO2 Mini does not support closed captioning.

MXO2 lets you capture and play back video with digital closed captioning using the Matrox 4VANC tool (see "Matrox 4VANC closed caption capture and playback" on page 72). This section details the settings for capturing and playing back Matrox 4VANC closed captioning using Final Cut Pro. You can also use Final Cut Pro to export a clip with Matrox 4VANC closed captioning to a file for playback using Final Cut Pro or Matrox Vetura Playback (see Chapter 11, "Using Matrox Vetura Capture and Vetura Playback"). For more information about any of the features mentioned in this section, see your Final Cut Pro documentation.

Settings for capturing Matrox 4VANC closed captioning

When capturing using MXO2's SDI input, MXO2 uses audio track 16 to preserve the closed caption data from your video's VANC (vertical ancillary data space). Prior to capturing, you must enable track 16 in Final Cut Pro as follows:

1. Open Final Cut Pro, and load an MXO2 Easy Setup (see "Loading a Matrox MXO2 Easy Setup" on page 85).
2. Choose **File > Log and Capture**.
3. In the **Log and Capture** window, click the **Clip Settings** tab.
4. In the audio area of the **Clip Settings** tab, enable track 16.

Note See also "Ensuring frame-accurate capture and edit-to-tape" on page 92 for general capture settings for Final Cut Pro.

Settings for playing back Matrox 4VANC closed captioning

During playback, MXO2 retrieves the closed caption data from the Matrox 4VANC audio track that is assigned to audio output 16 in Final Cut Pro. Set your playback settings as follows:

1. Open Final Cut Pro, and load an MXO2 Easy Setup (see "Loading a Matrox MXO2 Easy Setup" on page 85).
2. Choose **Sequence > Settings**.
3. On the **General** pane, under **Audio Settings**, select **48 kHz** from the **Rate** menu, and **24-bit** from the **Depth** menu.
4. On the **Audio Outputs** pane, enable 16 channels of audio for your sequence by selecting **16** from the **Outputs** menu, set tracks 15 and 16 as **Dual Mono**, and then set the **Downmix** value to 0 for track 16.

Note Audio track 15 can be used for AFD data (see "Specifying settings for Matrox 4VANC AFD" on page 90).

5 Click **OK**.

6 Choose **Final Cut Pro > User Preferences**.

7 On the **General** pane, select **Medium** or **High** from the **Audio Playback Quality** menu, and then click **OK**.

8 Assign the audio track that contains the Matrox 4VANC closed caption data on your timeline to audio output 16.

9 To avoid having to render a part of your sequence for playback when working with more than eight audio tracks, set the **Real-Time Audio Mixing** option to **16** in **Final Cut Pro > User Preferences**.

Note To preserve the integrity of the closed caption data for playback, do not manipulate the audio track that contains the closed caption data in any way. For example, do not adjust the audio gain or balance, or add audio effects to the tracks.

Settings for exporting Matrox 4VANC closed captioning

To maintain the Matrox 4VANC closed caption data when exporting a clip to a file for playback using Final Cut Pro or Matrox Vetura Playback (see Chapter 11, “Using Matrox Vetura Capture and Vetura Playback”), you must observe the following criteria:

- If you want to play back the exported file with closed captioning using Matrox Vetura Playback, assign the audio track that contains the Matrox 4VANC closed caption data on your timeline to audio output 16. To do so, choose **Sequence > Settings**, and on the **Audio Outputs** pane, enable 16 channels of audio for your sequence by selecting **16** from the **Outputs** menu. Set tracks 15 and 16 as **Dual Mono**, and then assign the audio track that contains the Matrox 4VANC closed caption data on your timeline to audio output 16.

  Note To avoid having to render a part of your sequence when working with more than eight audio tracks, set the **Real-Time Audio Mixing** option to **16** in **Final Cut Pro > User Preferences**.

- The audio must be set to **24-bit 48 kHz**, and the audio configuration must be set to **Discrete Channels**.
- Use a lossless or uncompressed audio format. Compressed audio formats are not supported.

Note Use the **File > Export > QuickTime Movie** export option to set your audio settings for export. You cannot set audio settings for export using the **Using QuickTime Conversion** export option.

Specifying settings for Matrox 4VANC AFD

Note Matrox MXO2 Mini does not support AFD.

MXO2 lets you capture the AFD (active format description) data stored in your video's VANC, along with your video, and restore the AFD data during playback, using the Matrox 4VANC tool (see "Matrox 4VANC AFD capture and playback" on page 70). This section details the settings for capturing and playing back Matrox 4VANC AFD using Final Cut Pro. You can also use Final Cut Pro to export a clip with Matrox 4VANC AFD to a file for playback using Final Cut Pro or Matrox Vetura Playback (see Chapter 11, "Using Matrox Vetura Capture and Vetura Playback"). For more information about any of the features mentioned in this section, see your Final Cut Pro documentation.

Settings for capturing Matrox 4VANC AFD

When capturing using MXO2's SDI input, MXO2 uses audio track 15 to preserve the AFD data from your video's VANC (vertical ancillary data space). Prior to capturing, you must enable track 15 in Final Cut Pro as follows:

1. Open Final Cut Pro, and load an MXO2 Easy Setup (see "Loading a Matrox MXO2 Easy Setup" on page 85).
2. Choose **File > Log and Capture**.
3. In the **Log and Capture** window, click the **Clip Settings** tab.
4. In the audio area of the **Clip Settings** tab, enable track 15.

Note See also "Ensuring frame-accurate capture and edit-to-tape" on page 92 for general capture settings for Final Cut Pro.

Settings for playing back Matrox 4VANC AFD

During playback, MXO2 retrieves the closed caption data from the Matrox 4VANC audio track that is assigned to audio output 15 in Final Cut Pro. Set your playback settings as follows:

1. Open Final Cut Pro, and load an MXO2 Easy Setup (see "Loading a Matrox MXO2 Easy Setup" on page 85).
2. Choose **Sequence > Settings**.
3. On the **General** pane, under **Audio Settings**, select **48 kHz** from the **Rate** menu, and **24-bit** from the **Depth** menu.
4. On the **Audio Outputs** pane, enable 16 channels of audio for your sequence by selecting **16** from the **Outputs** menu, set tracks 15 and 16 as **Dual Mono**, and then set the **Downmix** value to 0 for track 15.

   Note Audio track 16 can be used for closed captioning (see "Specifying settings for Matrox 4VANC closed captioning" on page 88).
5. Click **OK**.

6 Choose **Final Cut Pro > User Preferences**.

7 On the **General** pane, select **Medium** or **High** from the **Audio Playback Quality** menu, and then click **OK**.

8 Assign the audio track that contains the Matrox 4VANC AFD data on your timeline to audio output 15.

9 To avoid having to render a part of your sequence for playback when working with more than eight audio tracks, set the **Real-Time Audio Mixing** option to **16** in **Final Cut Pro > User Preferences**.

Note To preserve the integrity of the AFD data for playback, do not manipulate the audio track that contains the AFD data in any way. For example, do not adjust the audio gain or balance, or add audio effects to the tracks.

Settings for exporting Matrox 4VANC AFD

To maintain the Matrox 4VANC AFD data when exporting a clip with Matrox 4VANC AFD data to a file for playback using Final Cut Pro or Matrox Vetura Playback (see Chapter 11, “Using Matrox Vetura Capture and Vetura Playback”), you must observe the following criteria:

- If you want to play back the exported file with AFD data using Matrox Vetura Playback, assign the audio track that contains the Matrox 4VANC AFD data on your timeline to audio output 15. To do so, choose **Sequence > Settings**, and on the **Audio Outputs** pane, enable 16 channels of audio for your sequence by selecting **16** from the **Outputs** menu. Set tracks 15 and 16 as **Dual Mono**, and then assign the audio track that contains the Matrox 4VANC AFD data on your timeline to audio output 15.

  Note To avoid having to render a part of your sequence when working with more than eight audio tracks, set the **Real-Time Audio Mixing** option to **16** in **Final Cut Pro > User Preferences**.

- The audio must be set to **24-bit 48 kHz**, and the audio configuration must be set to **Discrete Channels**.
- Use a lossless or uncompressed audio format. Compressed audio formats are not supported.

Note Use the **File > Export > QuickTime Movie** export option to set your audio settings for export. You cannot set audio settings for export using the **Using QuickTime Conversion** export option.

Specifying your video and audio output device settings

This section explains how to specify your video and audio output device settings in Final Cut Pro for use with MXO2.

To specify settings for Final Cut Pro

1. Open Final Cut Pro and choose **View > Video Playback**, and select the **Matrox MXO2** setting that matches your project's sequence setting.
2. Choose **View > Audio Playback**, and select **Matrox MXO2 Audio Output**.

Note If **Audio Follows Video** is enabled in the **Audio Playback** menu, **Matrox MXO2 Audio Output** will be automatically enabled once you've selected an MXO2 setting for video playback.

3. Enable Final Cut Pro's external video by choosing **View > External Video > All Frames**.

Ensuring frame-accurate capture and edit-to-tape

Note Matrox MXO2 Mini does not support device control.

Matrox MXO2 device control lets you control an RS-422 device, such as a VTR or digital disk recorder, for frame-accurate capture and edit-to-tape. For detailed information on capture and edit-to-tape, see your Final Cut Pro documentation.

Setting your capture settings

For frame-accurate capture using Final Cut Pro with Matrox MXO2, set the capture settings as follows:

1. Open Final Cut Pro and choose **File > Log and Capture**.
2. In the **Log and Capture** window, click the **Capture Settings** tab.
3. From the **Device Control** menu, select a Matrox MXO2 device control preset. To create or edit an MXO2 device control preset, see "Creating and editing MXO2 device control presets" on page 87.
4. From the **Capture/Input** menu, select a Matrox MXO2 capture preset. To create or edit an MXO2 capture preset, see "Creating and editing MXO2 capture presets" on page 86.
5. To set your audio capture settings, including which MXO2 audio input channels you want to capture, click the **Clip Settings** tab and specify your settings in the **Audio** section. For information on how to set your audio channel settings for capture, see your Final Cut Pro documentation.

Note If you want to capture video with closed captioning or AFD, see "Settings for capturing Matrox 4VANC closed captioning" on page 88, or "Settings for capturing Matrox 4VANC AFD" on page 90.

Setting your edit-to-tape settings

For frame-accurate edit-to-tape using Final Cut Pro with Matrox MXO2, set the edit-to-tape settings as follows:

1. Open Final Cut Pro and choose **File > Edit To Tape**.
2. In the **Edit To Tape** window, click the **Device Settings** tab.
3. From the **Device Control** menu, select a Matrox MXO2 device control preset. To create or edit an MXO2 device control preset, see "Creating and editing MXO2 device control presets" on page 87.
4. If you'll be performing an insert edit, from the **Capture/Input** menu, select a Matrox MXO2 capture preset that is compatible with your tape. This is required to allow you to preview your tape to see what the edit will look like in Final Cut Pro's **Edit to Tape** window. To create or edit an MXO2 capture preset, see "Creating and editing MXO2 capture presets" on page 86.

   Note To preview video from your tape, you must connect video and audio outputs from your recorder to the corresponding inputs on MXO2, and then set the MXO2 A/V input settings accordingly (see "Specifying your A/V input settings" on page 57).
5. To avoid having black frames recorded at the end of an insert edit, make sure that **Editing**, instead of **Mastering**, is selected as the edit-to-tape mode. To do this, in the **Edit To Tape** window, click the **Video** tab, and then select **Editing** from the Mode menu.
6. When performing an edit-to-tape on some RS-422 devices, a delay may occur between the time that Final Cut Pro starts to play back your project and the time the device starts recording. To ensure that your edit-to-tape does not miss any frames, you can delay the playback of your project by adjusting the **Playback Offset** setting for the device control preset that you selected in step 3 (see "Creating and editing MXO2 device control presets" on page 87).

Working with Apple Color and Apple Motion

You can output an Apple Color or Apple Motion project using the MXO2 outputs by setting MXO2 as your video output device.

Apple Color

Perform the following steps to set MXO2 as your video output device in Apple Color:

1. Open Apple Color, and load your project.
2. Choose **Color > Preferences**, and select the **Matrox MXO2** setting that matches your project from the **Video Output** list.

Apple Motion

Perform the following steps to set MXO2 as your video output device in Apple Motion:

1. Open Apple Motion, and load your project.
2. Choose **Motion > Preferences > Output**, and select the **Matrox MXO2** setting that matches your project from the **Video Output** list.

Working with Adobe Premiere Pro

You can use Adobe Premiere Pro to play back and output video and audio using Matrox MXO2. To capture using Matrox MXO2, use the Matrox Vetura Capture application (see Chapter 11, “Using Matrox Vetura Capture and Vetura Playback”). For a list of the supported video output formats for the MXO2 main and SD channels, and the supported video formats for the MXO2 outputs, see Appendix D, “Matrox MXO2 Supported Output Formats.”

Creating a new Matrox MXO2 project

The MXO2 video output plug-in for Premiere Pro includes Matrox presets that you can use to quickly set up your project. The Matrox presets set the editing mode to **Matrox Player**. This allows you to output your video and audio using your MXO2 outputs.

1. Start Adobe Premiere Pro and click the **New Project** icon. The **New Project** window appears. You can leave all the settings on the **General** pane at the default settings. For details on changing these settings, see your Adobe Premiere Pro documentation.
2. On the **Scratch Disks** pane, use the **Browse** button to select an appropriate A/V drive for each scratch disk type. When specifying the location of your scratch disks, make sure you follow the recommendations in your Adobe Premiere Pro documentation. For example, store your video and audio files on a separate hard drive dedicated to your media assets.

Tip Specifying the same scratch disk settings for all your projects will help shorten the amount of time it takes to open new or existing projects.

3. From the **Location** list, select where you want to save your project.
4. Specify a **Name** for your project.
5. Click **OK** to save your settings. The **New Sequence** window opens on the **Sequence Presets** pane.
6. Under **Available Presets**, select the preset that matches the type of sequence that you want to create from the **Matrox Presets** folder.
7. On the **Settings** pane, click **Playback Settings** next to **Editing Mode**, and select or clear the **Report dropped frames** option. When selected, a message will appear in Premiere Pro when one or more frames are dropped during playback. Click **OK**.
8. Specify a **Sequence Name**.
9. Click **OK** to apply the settings.
10. Set the appropriate video and audio output settings in the MXO2 preferences window (see Chapter 7, “Configuring Your MXO2 System”).

Remarks

- If you want to monitor audio from the MXO2 outputs when playing back video from Premiere Pro’s Source Monitor, choose **Premiere Pro > Preferences > Player Settings**, and then select **Matrox Player** from the **Default Player** list.
- To avoid playback issues when using **Matrox Player** as the editing mode, make sure that a Matrox audio option is not selected for **Audio Hardware** and **Audio Output Mapping** in **Premiere Pro > Preferences**.
- 1920×1080p at 23.98, 25, and 29.97 fps projects are played back in PsF format.
- Be aware that when you perform an export to file, Premiere Pro limits the number of audio channels that you can export to six. Therefore, you will not be able to export more than six audio channels from your Matrox MXO2 project.

Working with Adobe Encore

The MXO2 video output plug-in for Encore lets you monitor video and audio from your Encore project using the MXO2 outputs. For a list of the supported video output formats for the MXO2 main and SD channels, and the supported video formats for the MXO2 outputs, see Appendix D, "Matrox MXO2 Supported Output Formats."

Creating a new Matrox MXO2 project

Perform the following steps to create a new Matrox project in Encore.

1. Start Adobe Encore and click the **New Project** icon. The **New Project** window appears. Specify the settings on the **Basic** pane. For details on these settings, see your Adobe Encore documentation.
2. On the **Advanced** pane, select **Matrox Player** from the **Player** list, and then click **OK**.
3. To select or clear the **Report dropped frames** option, choose **Encore > Preferences > Audio/Video Out**, and then click **Video Output Device**. When selected, a message will appear in Encore when one or more frames are dropped during playback. Click **OK**.
4. Set the appropriate video and audio output settings in the MXO2 preferences window (see Chapter 7, "Configuring Your MXO2 System").

Important When using **Matrox Player** as the player in Encore, make sure that a Matrox audio option is not selected as the **Audio Output Device** from **Encore > Preferences > Audio/Video Out**.

Working with Adobe After Effects

The Matrox WYSIWYG plug-in for After Effects lets you monitor video and audio from your After Effects project using the MXO2 outputs. Matrox also provides WYSIWYG options that you can set to customize your output preview.

Perform the following steps to output video and audio from the MXO2 outputs during playback in After Effects:

1. Start Adobe After Effects and either open an existing project, or start a new composition. If necessary, import your clip.
2. Set the MXO2 WYSIWYG settings in the MXO2 preferences window (see "Specifying your Matrox WYSIWYG settings" on page 74).
3. Play back your clip. When playing back your clip in After Effects, the video portion of your clip is sent to the MXO2 outputs automatically. However, if you want to monitor audio from the MXO2 outputs as well, you must play back your clip in RAM Preview mode. To do so, choose **After Effects > Preferences > Audio Hardware**, select **Matrox MXO2 Audio Output**

from the **Default Device** list, and launch RAM Preview (**Composition > Preview > RAM Preview**).

Working with Adobe Photoshop

The Matrox WYSIWYG plug-in for Photoshop lets you export your Photoshop image to the MXO2 outputs for monitoring. Matrox also provides WYSIWYG options that you can set to customize your output preview.

Perform the following steps to export your Photoshop image to the MXO2 outputs:

1. Start Adobe Photoshop and either open an existing image file, or start a new project.
2. Set the MXO2 WYSIWYG settings in the MXO2 preferences window (see "Specifying your Matrox WYSIWYG settings" on page 74).
3. Export your image to the MXO2 outputs by choosing **File > Export > Matrox WYSIWYG Preview**. If you make a change to your image, or to the Matrox WYSIWYG options, you must export the image again to refresh the output.

Tip You can create a Photoshop Action shortcut for **File > Export > Matrox WYSIWYG Preview**. For information on creating Actions, see your Adobe Photoshop documentation.

Using Matrox MXO2 with live media streaming applications

You can use your Matrox MXO2 system as an input device to feed live video and audio to streaming media encoding applications, such as Adobe Flash Media Live Encoder, QuickTime Broadcaster, and Telestream Wirecast. This lets you stream media for broadcasting live events such as sports, concerts, news, educational seminars, and corporate meetings. For example, you can select any video and audio source connected to the MXO2 inputs as your A/V sources for use with Adobe Flash Media Live Encoder, scale the incoming video to the streaming format that you want using the MXO2 hardware scaler, and stream the live video and audio to a public distribution website or your dedicated IP hosting site.

Selecting MXO2 as the A/V input device

The following instructions are guidelines for using MXO2 with the supported media streaming applications, except Telestream Wirecast. For instructions on using Telestream Wirecast, see "Working with Telestream Wirecast" on page 99.

For details on how to specify encoding settings in your streaming media encoding application, refer to your application's documentation.

1. Connect the video and audio input sources that you want to stream to the corresponding inputs on your MXO2 hardware.
2. Specify the MXO2 A/V input settings in the MXO2 preferences window (see "Specifying your A/V input settings" on page 57).
3. Start your media streaming encoding application, and select a Matrox 8-bit format as the source video device in your application. The format that you select depends on whether or not you want to scale your source video for streaming:
   - **No scaling** In your application's source video device list, select the Matrox 8-bit format that matches the format of your source video.
   - **Scaling** For increased performance and decreased CPU usage when scaling your source video, we recommend that you enable the scaling option available in the MXO2 A/V input settings (see "Specifying your A/V input settings" on page 57). When the MXO2 scaling option is enabled, scaling is performed by MXO2's hardware scaler, which frees your system's resources for other tasks.
     - **MXO2's scaling option enabled** In your application's source video device list, select the Matrox 8-bit format to which you want to scale your source video. In other words, select that Matrox 8-bit option that matches the format that you want to output. The format that you select must have a compatible frame rate to your source video. If the resolution that you want to output does not appear in the list of available Matrox formats, select the resolution that is closest to your desired output size. For example, if you want to scale your source video to 640x360, select **Matrox MXO2 - NTSC YUV 8-bit**. You can later specify the exact output resolution in your application's output settings.
     - **MXO2's scaling option disabled** In your application's source video device list, select the Matrox 8-bit format that matches the format of your source video. In this case, the scaling will be performed entirely by your application when you specify the output resolution in your application's output settings.

Note Matrox 10-bit format options are not compatible for use with live media streaming applications.

4. Select **Matrox MXO2 Audio Input** as the source audio device in your application.
5. Set any additional encoding options in your application as you would normally, and then output your video.

Note If using Adobe Flash Media Live Encoder, for increased performance when scaling the source video for streaming and MXO2's scaling option is enabled, we recommend that you set the **Input Size** encoding option resolution to match the resolution of the format that you selected in step 3.

Working with Telestream Wirecast

This section provides instructions on how to use MXO2 as the input device for video and audio in Telestream Wirecast. For instructions on using other supported media streaming applications, see "Selecting MXO2 as the A/V input device" on page 97.

Refer to Telestream Wirecast's documentation for details on how to specify encoding settings within Telestream Wirecast.

1. Connect the video and audio input sources that you want to stream to the corresponding inputs on your MXO2 hardware.
2. Specify the MXO2 A/V input settings in the MXO2 preferences window (see "Specifying your A/V input settings" on page 57).
3. Start Telestream Wirecast, and add a new shot by clicking the button and selecting **Matrox MXO2 - 1080i 59.94 YUV 8-bit Shot**. If this action does not result in a new shot being added, click the button again and select **Matrox MXO2 - 1080i 50 YUV 8-bit Shot** instead.
4. Make sure the new Matrox shot is selected, click the button, and select **Matrox MXO2 Audio Input** as the audio source for the shot.

Note If **Matrox MXO2 Audio Input** does not appear in the list of available audio input sources, click the button, and select **Matrox MXO2 Audio Input**. The Matrox audio input should now appear in the list of available audio input sources. You can delete the Matrox audio shot that you just added.

5. Make sure the Matrox shot is selected, and choose **Sources > Show Sources Settings**.
6. From the **System Devices** list, select the same Matrox format that was used to add a new shot in step **3**, and then click **Configure**.
7. In the **Sources** pane of the **Video** window, select a Matrox 8-bit format as the source video. The format that you select depends on whether or not you want to scale your source video for streaming:
   - **No scaling** Select the Matrox 8-bit format that matches the format of your source video.
   - **Scaling** The format that you select depends on whether you use the Matrox scaling option. For increased performance and decreased CPU usage when scaling your source video, we recommend that you enable the scaling option available in the MXO2 A/V input settings (see "Specifying your A/V input settings" on page 57). When the MXO2 scaling option is enabled, scaling is performed by MXO2's hardware scaler, which frees your system's resources for other tasks.
     - **MXO2's scaling option enabled** In the **Sources** pane of the **Video** window, select the Matrox 8-bit format to which you want to scale your source video. In other words, select that Matrox 8-bit option that

matches the format that you want to output. The format that you select must have a compatible frame rate to your source video. If the resolution that you want to output does not appear in the list of available Matrox formats, select the resolution that is closest to your desired output size. For example, if you want to scale your source video to 640x360, select **Matrox MXO2 - NTSC YUV 8-bit**. You can later specify the exact broadcast resolution in Telestream Wirecast's output settings.

- **MXO2's scaling option disabled** In the **Sources** pane of the **Video** window, select the Matrox 8-bit format that matches the format of your source video. In this case, the scaling will be performed entirely by Telestream Wirecast when you specify the desired broadcast resolution.

Note Matrox 10-bit format options are not compatible for use with Telestream Wirecast.

8 Set any additional encoding options in Telestream Wirecast as you would normally, and then output your video.

10

Using the Matrox MAX H.264 Codec

This chapter explains how to use the Matrox MAX H.264 codec that is available on Matrox MXO2 products with MAX technology for exporting material to Blu-ray and other media formats.

Overview

If you have an MXO2 product with Matrox MAX technology, you can quickly and easily create H.264 files for Blu-ray Disc and other media formats using the Matrox MAX H.264 codec. You can take advantage of all the familiar settings in your preferred application, and use the Matrox MAX predefined settings or customize your own settings. As an added benefit, the Matrox MAX technology lets you directly export to higher-quality H.264 Blu-ray compliant files from Compressor. You can also use the Matrox MAX H.264 settings in other QuickTime-based applications, such as Apple Final Cut Pro, QuickTime Pro, and Adobe Media Encoder to accelerate the encoding of H.264 material.

Remarks

- Non-Matrox compression options that are available in Compressor and other QuickTime-based applications are not optimized to use MXO2 to accelerate H.264 encoding. As a result, the use of non-Matrox options in a supported application may result in increased encoding times.
- The MXO2 inputs and outputs will not be available when creating H.264 files using the Matrox MAX H.264 codec. This limitation, however, does not apply if your system includes a Matrox CompressHD card. In this case, the Matrox MAX H.264 codec on your Matrox CompressHD card will always be used, and your MXO2 inputs and outputs will be available when creating H.264 files.

Using Apple Compressor

The Matrox MAX H.264 component for Apple Compressor includes predefined Matrox MAX H.264 settings that you can assign to immediately apply appropriate compression settings for delivering H.264 files for Blu-ray, the web, and mobile devices. For most deliverables, you can use one of the predefined Matrox MAX H.264 settings in Compressor (see “Assigning a Matrox MAX H.264 setting” on page 103). However, if you require a custom setting, see “Creating a custom Matrox MAX H.264 setting” on page 104. For detailed information on settings and other Compressor-related subjects, see your Apple Compressor documentation.

The Matrox MAX H.264 Blu-ray settings encode video only. Audio is not encoded by the Matrox MAX H.264 codec when creating H.264 elementary streams for Blu-ray. To include audio when exporting to Blu-ray format, you must assign a separate audio setting to your source media file. However, audio is encoded by the Matrox MAX H.264 codec when creating QuickTime files for the web and mobile devices. The Matrox MAX H.264 elementary stream files that you create for Blu-ray Disc using Compressor can be imported directly to Adobe Encore CS5 and Roxio Toast without having to transcode the files.

Matrox MAX technology also supports the closed caption data from SCC files for web deliverables (*.mov*) when encoding at 1:1, or when downscaling. When an SCC (CEA-608) closed caption file is associated with your source media file in Compressor, Matrox MAX technology embeds the closed caption data to the encoded video file (*.mov*).

Assigning a Matrox MAX H.264 setting

This section describes how to assign a Matrox MAX H.264 setting to your source file in Apple Compressor. The Matrox MAX H.264 settings include the predefined settings installed with your MXO2 software, and any custom settings that you create (see "Creating a custom Matrox MAX H.264 setting" on page 104).

Note When selecting a predefined Matrox MAX H.264 setting, any modifications made to your source video's frame size in your application must be taken into consideration. For example, if your source video was cropped in your application, your source video's frame size is the cropped frame size and not the original frame size.

The predefined Matrox MAX H.264 settings that are installed with your MXO2 software are located in Compressor's **Settings** window, under **Custom > Matrox MAX H.264 Settings**. The predefined Matrox MAX H.264 settings are separated into three folders: Blu-ray, Fast Encode, and High-Quality:

- **Blu-ray** Use these settings for all Blu-ray deliverables. The encoded file's extension will be *.264*.

  Note For compatibility with most Blu-ray players and Adobe Encore CS5, the predefined Matrox MAX H.264 settings for Blu-ray use a simple GOP structure.

- **Fast Encode** Use these settings for fast encoding of QuickTime files. These settings leverage your system's resources with the MXO2 hardware, resulting in even faster encoding times. The encoded file's extension will be *.mov*.

  Note If your source video must be scaled for encoding and its aspect ratio does not match the compression aspect ratio, with Compressor v3.5 or later, you can select **Preserve source aspect ratio** from the **Padding** list in Compressor's Geometry pane to maintain your source video's aspect ratio.

- **High-Quality** Use these settings for high-quality encoding of QuickTime files. With these settings, the encoding is performed entirely by the MXO2 hardware, which frees your system's resources for other tasks. The encoded file's extension will be *.mov*.

To assign a Matrox MAX H.264 setting:

1. In Apple Compressor, add the source media file that you want to export as an H.264 file to the **Batch** window in Compressor.
2. Drag the desired **Matrox MAX H.264** setting from the **Settings** window to your source media file (job) in the **Batch** window.

Note Matrox MAX technology supports closed caption data from SCC files for web deliverables (*.mov*) when encoding at 1:1, or when downscaling. When an SCC (CEA-608) closed caption file is associated with your source media file in Compressor, Matrox MAX technology embeds the closed caption data to the encoded video file (*.mov*).

3. If you're exporting to Blu-ray format and you want to export audio as well, you must add a separate audio setting to your **Batch** window. Matrox provides predefined audio settings for each of the Matrox settings, however, you can choose to use another audio setting.
4. Choose a destination for your job's targets and submit your batch as you would normally.

Creating a custom Matrox MAX H.264 setting

You can create a custom Matrox MAX H.264 setting in Apple Compressor for delivering H.264 files for either Blu-ray (*.264*) or QuickTime (*.mov*). Once you create a new Matrox MAX H.264 setting, you can assign it to your source file in Apple Compressor using the steps described in "Assigning a Matrox MAX H.264 setting" on page 103.

Important To avoid losing your custom Matrox MAX H.264 settings in Compressor when updating your MXO2 software, you must uninstall the MXO2 software that is installed on your system, restart your computer, and then install the new MXO2 software version **before** opening Compressor. If you open Compressor before installing the new MXO2 software, that is, with no MXO2 software installed on your computer, your custom Matrox MAX H.264 settings will be deleted by Compressor.

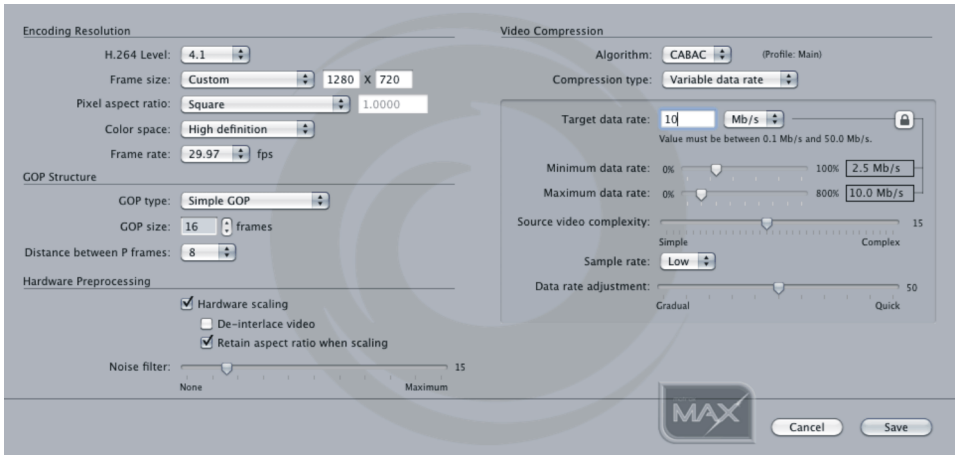
1. In Apple Compressor, click the **Create a new setting** button in the **Settings** window, and then click either **Matrox MAX H.264 (.264)** for Blu-ray or **Matrox MAX H.264 (.mov)** for QuickTime.

Note You can also select and duplicate an existing Matrox MAX H.264 setting that you want to use as a starting point for creating the new setting.

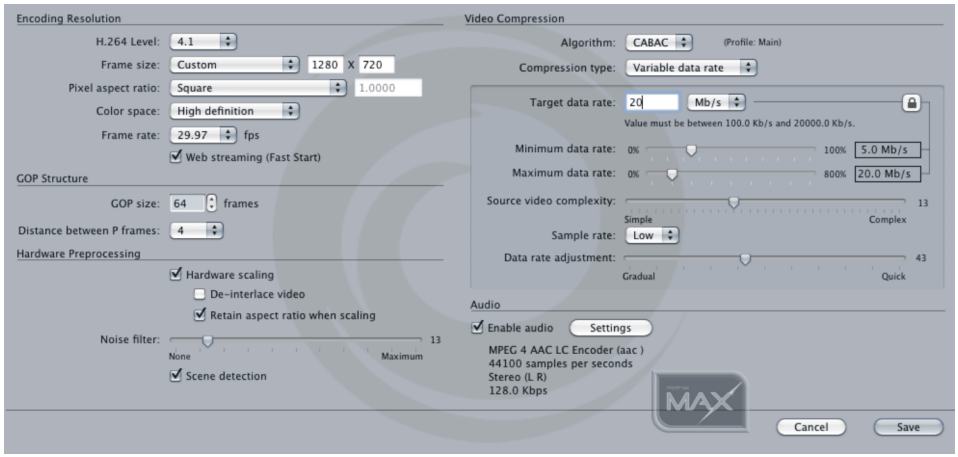
2. In the **Inspector** window, type a **Name** and **Description**.
3. On the **Encoder** pane of the **Inspector** window, make sure that **File Format** is set to **Matrox MAX H.264 (.264)** for Blu-ray or **Matrox MAX H.264**

(.mov) for QuickTime, and **Extension** is set to **264** for Blu-ray or **mov** for QuickTime, and then click **Options**.

(.264 options)


Encoding Resolution
H.264 Level: 4.1
Frame size: Custom 1280 X 720
Pixel aspect ratio: Square 1.0000
Color space: High definition
Frame rate: 29.97 fps
GOP Structure
GOP type: Simple GOP
GOP size: 16 frames
Distance between P frames: 8
Hardware Preprocessing
Hardware scaling
De-interlace video
Retain aspect ratio when scaling
Noise filter: None Maximum 15
Video Compression
Algorithm: CABAC (Profile: Main)
Compression type: Variable data rate
Target data rate: 10 Mb/s
Value must be between 0.1 Mb/s and 50.0 Mb/s.
Minimum data rate: 0% 100% 2.5 Mb/s
Maximum data rate: 0% 800% 10.0 Mb/s
Source video complexity: Simple Complex 15
Sample rate: Low
Data rate adjustment: Gradual Quick 50
Cancel
Save

(.mov options)



4 Under **Encoding Resolution**, select the resolution settings for your encoded video:

Note Matrox MAX technology supports closed caption data from SCC files for web deliverables (*.mov*) when encoding at 1:1, or when downscaling. When an SCC (CEA-608) closed caption file is associated with your source media file in Compressor, Matrox MAX technology embeds the closed caption data to the encoded video file (*.mov*).

– **H.264 Level** Select the H.264 level that you want for your encoded video.

H.264 level	Maximum Frame size	Maximum Frame rate (fps)	Maximum Data rate (Mb/s)
2.0	352×288	29.97	2
3.0	720×576	29.97	10
3.1	1280×720	29.97	14
4.0	1920×1080	29.97	20
4.1	1920×1080	29.97	50
4.2	1920×1080	59.94	50

Remarks

– Use H.264 level 4.0 if you want to create Matrox MAX H.264 files intended for mass replication of Blu-ray Discs. You can use either level 4.0 or 4.1 if you want to author and burn individual copies that are compatible with Blu-ray Disc players.

– Use H.264 level 3.1 to create HD video for use with Apple iPad.

– **Frame size** Specify the frame size that you want for your encoded video. You can select a frame size from the list, or select **Custom** and enter a frame size (horizontal×vertical). If entering a custom frame size, the minimum frame size is 64×64, and the maximum frame size depends on the selected H.264 level. The horizontal and vertical values must be even numbers.

Note The available frame sizes in the list depend on the selected H.264 level. If the compression frame size differs from your source video's frame size, MXO2's onboard scaler will either upscale or downscale your source video.

– **Pixel aspect ratio** If you entered a custom compression frame size, specify a pixel aspect ratio for your encoded video. You can select a pixel aspect ratio from the list, or enter a custom value:

- **Custom** Enter a custom pixel aspect ratio using a decimal value.
- **Square** Use this for video that will be displayed on a computer, or when exporting to 1280×720 or 1920×1080.
- **NTSC (4:3)** Sets the pixel aspect ratio to 4:3 using 720×480 pixels.
- **NTSC (16:9)** Sets the pixel aspect ratio to 16:9 using 720×480 pixels.
- **PAL (4:3)** Sets the pixel aspect ratio to 4:3 using 720×576 pixels.
- **PAL (16:9)** Sets the pixel aspect ratio to 16:9 using 720×576 pixels.

- **DVCPRO HD 720p** Sets the pixel aspect ratio to 16:9 using 960×720 pixels.
- **DVCPRO HD 1080i 59.94** Sets the pixel aspect ratio to 16:9 using 1280×1080 pixels.
- **DVCPRO HD 1080i 50 / HDV** Sets the pixel aspect ratio to 16:9 using 1440×1080 pixels.

– **Color space** If you entered a custom compression frame size, specify a color space for your encoded video.

– **Frame rate** Select the frame rate that you want for your encoded video.

– **Web streaming (Fast Start)** (*.mov* files only) Select this option if you want your encoded *.mov* QuickTime file to play as it is being downloaded from a standard web server. This option encodes your video as a QuickTime "Fast Start" file. When the file is being downloaded, it will begin to play back from a QuickTime application once enough data has been downloaded to the system for uninterrupted playback. This option ensures high-quality playback regardless of internet connection speed. However, viewers with slower connection speeds may wait longer before the file begins to play.

5 Under **GOP Structure**, specify the GOP structure settings that you want the Matrox MAX H.264 codec to use to encode your video:

– **GOP type** (*.264* files only) Select the type of GOP structure for your encoded video:

- **Simple GOP** Offers a fixed structure in how frames are referenced, and may be more easily decoded than advanced GOPs.
- **Advanced GOP (short/long)** An advanced GOP has more structural flexibility than a simple GOP, is capable of using more reference frames, and therefore may provide better overall compression. For a "short" advanced GOP, the distance between P frames is always 4, and for a "long" advanced GOP, the distance between P frames is always 8.

Important An H.264 elementary stream file for Blu-ray that was created using an advanced GOP structure may not be compatible with some Blu-ray players, and may cause stability issues in Adobe Encore CS5 when burning a Blu-ray Disc. For compatibility with most Blu-ray players and Adobe Encore CS5, we recommend using a simple GOP structure when encoding to Blu-ray.

– **GOP size** Select the GOP size in frames (must be a multiple of the distance between P frames). The GOP size can be either 2048, or an integer value between 3 and 254.

Note When creating an H.264 elementary stream file for Blu-ray, the GOP size must be less than one second of video. For example, if the frame rate that you want for your encoded video is 29.97 fps, the GOP size must be 29 frames or less.

- **Distance between P frames** Select the number of frames between P frames that you want for your GOP structure. This setting can be changed for a simple GOP structure only.

6 Under **Hardware Preprocessing**, specify the hardware-related processing settings for your encoded video:

- **Hardware scaling** If your source video must be scaled for encoding, select this option if you want the scaling to be done by the MXO2 hardware. This produces the best-quality results and frees your system's resources for other tasks. Clear this option to leverage your system's resources with the MXO2 hardware for even faster encoding times. If enabled, specify the following scaling options:
  - **De-interlace video** Select this option if your source video is interlaced and you want to de-interlace your video before encoding. This option can be used to display your encoded video on a monitor that displays lines progressively, such as an LCD or computer monitor. For all other instances, make sure this option is not selected.
  - **Retain aspect ratio when scaling** If your source video must be scaled for encoding, and its aspect ratio does not match your selected compression aspect ratio, select this option to maintain your source video's aspect ratio. If this option is selected, MXO2 will encode your source video as pillarbox video when encoding to a larger aspect ratio, or letterbox video when encoding to a smaller aspect ratio. If this option is not selected, MXO2 will encode your source video as anamorphic video.

Important When your source video must be scaled for encoding and **Hardware scaling** is disabled, if you're working with Compressor v3.5 or later you can select **Preserve source aspect ratio** from the **Padding** list in Compressor's Geometry pane to maintain your source video's aspect ratio.

- **Noise Filter** Sets the level of noise filtering that you want to apply to your video before encoding. Increasing the noise filter level reduces the amount of high frequencies in your source video by softening the high-detail portions of your video. Since high frequencies require more bits to encode, increasing the noise filter level leaves more bits available for the encoding of other frames, which can improve the overall quality of your encoded video. However, if you lose too much detail in your encoded video you may need to decrease the noise filter level.
- **Scene detection** (*.mov* files only) Enabling this option allows the Matrox MAX H.264 codec to detect scene changes while encoding, and

encode these transitions as I-frames. This results in multi-pass quality in a single pass. This option can be useful for creating higher quality video at a given data rate. It's especially useful when encoding video with many scene changes and targeting a low data rate.

7 Under **Video Compression**, specify the compression settings for your encoded video:

- **Algorithm** Select the entropy coding method to be used during compression:
  - **CABAC** Uses the CABAC coding method, and defines the video stream as H.264 Main profile.
  - **CAVLC** Uses the CAVLC coding method, and defines the video stream as H.264 Baseline profile when **Distance between P frames** is set to 1. Otherwise, the video stream is defined as H.264 Main profile. This method is not supported when encoding to a frame size that has a width greater than 720.
- **Compression type** Select from the following compression types:
  - **Variable data rate** Video is compressed at varying data rates based on the complexity of the video and your specified minimum and maximum data rates. The Matrox MAX H.264 codec analyzes and encodes each frame to deliver the highest possible quality at your target data rate.
  - **Constant data rate** Video is compressed at your specified target data rate, which is useful when you need to limit or predict the size of your video file. However, if your video is very complex (such as scenes with many colors, sharp edges, or transitions), you'll need to specify a high target data rate to avoid having frames of blocky video in your file.
  - **Constant quality** Delivers your desired quality on each frame with no regard to data rate.

Remarks

- When using **Constant quality**, the entropy encoding algorithm must be set to CABAC.
- **Variable data rate** and **Constant quality** compression types are not recommended for delivering H.264 files for Blu-ray.

8 Specify the settings associated with your selected compression type:

- **Target data rate** (Variable/Constant data rate only) Enter the target data rate, in **Mb/s** or **Kb/s**, for your encoded video. The higher the target data rate you specify, the better the video quality will be.
- **Minimum/Maximum data rate** (Variable data rate only) If locked ( ) to the **Target data rate**, the minimum and maximum data rates are

set automatically and cannot be changed. Unlock the minimum and maximum data rates to set custom rates for your encoded video.

Note If you'll be using Adobe Encore CS5 or Apple Compressor 3.5 to burn the encoded H.264 file for Blu-ray, the maximum H.264 level and data rate accepted by these applications for Blu-ray authoring is H.264 level 4.1 at 35 Mb/s (Encore) and H.264 level 4.1 at 30 Mb/s (Compressor).

- **Source video complexity** (Variable data rate only) Specifies the complexity level of your source video. A complex video can be defined as containing scenes with many colors, sharp edges, or transitions. The Matrox MAX H.264 codec uses this setting to determine how much compression is required in order to deliver high-quality video at your specified target data rate. The default setting (15) is suitable for most moderately complex videos. For simpler or more complex videos, you may need to adjust this setting to obtain the highest-quality encoding possible while respecting your target data rate. If the size of your encoded video is good but the quality can be improved, lower the complexity level setting. Your video will then be encoded with less compression. If the quality of your encoded video is good but the size is larger than expected, raise the complexity level setting. Your video will then be encoded with more compression. In any case, you may need to try different settings to get your desired results.
- **Sample rate** (Variable/Constant data rate only) Determines how frequently the Matrox MAX H.264 codec verifies the current data rate while encoding and compares it to your specified target data rate. If a discrepancy exists between the current and target data rates, the current data rate is adjusted as specified by the **Data rate adjustment** option.
- **Data rate adjustment** (Variable/Constant data rate only) When the current encoding data rate does not match your specified target data rate, this setting determines how quickly the current data rate is adjusted to reach the target data rate. A gradual adjustment produces smoother transitions than a quick adjustment.
- **Encoding quality** (Constant quality only) Specifies the quality level for your encoded video. Every frame in your video will be encoded at the specified quality level with no regard to data rate.

9 For *.mov* files, select **Enable audio** under **Audio** to encode audio along with your video, and then click **Settings** to set your QuickTime movie audio settings.

Note To export a clip for use with Apple iPod or iPhone devices, you must choose AAC (advanced audio coding) as your export audio file format. To do this, in the **Sound Settings** window, select **AAC** from the **Format** list, and then click **Save**.

10 Click **Save**.

Using Adobe Media Encoder

This section details how to specify the Matrox MAX H.264 compression settings in Adobe Media Encoder for delivering QuickTime files for the web, and for use with Apple TV, iPod, iPhone, and other QuickTime-based devices. The encoded file's extension will be *.mov*.

The Matrox MAX H.264 component for Media Encoder includes predefined Matrox MAX H.264 presets that you can use to immediately apply appropriate compression settings for delivering H.264 files. For most deliverables, you can use one of the predefined Matrox MAX H.264 presets in Media Encoder (see "Assigning a Matrox MAX H.264 preset" on page 111). However, if you require a custom setting, see "Creating a custom Matrox MAX H.264 preset" on page 111.

Assigning a Matrox MAX H.264 preset

This section describes how to assign a Matrox MAX H.264 preset to your source file in Media Encoder. The Matrox MAX H.264 presets include the predefined presets installed with your MXO2 software, and any custom presets that you create (see "Creating a custom Matrox MAX H.264 preset" on page 111).

Note When selecting a predefined Matrox MAX H.264 preset, any modifications made to your source video's frame size in your application must be taken into consideration. For example, if your source video was cropped in your application, your source video's frame size is the cropped frame size and not the original frame size.

1. In Media Encoder, add the source clip or sequence to the queue.
2. In the **Queue** window, click the **Preset** arrow for the clip or sequence that you want to export, and select the desired **Matrox MAX** preset.

Note You can also select the preset from the **Export Settings** window.

3. Export the output(s) as you would normally.

Creating a custom Matrox MAX H.264 preset

You can create a custom Matrox MAX H.264 preset in Adobe Media Encoder for delivering QuickTime files for the web, and for use with Apple TV, iPod, iPhone, and other QuickTime-based devices. Once you create a new Matrox MAX H.264 preset, you can assign it to your source file in Media Encoder using the steps described in "Assigning a Matrox MAX H.264 preset" on page 111.

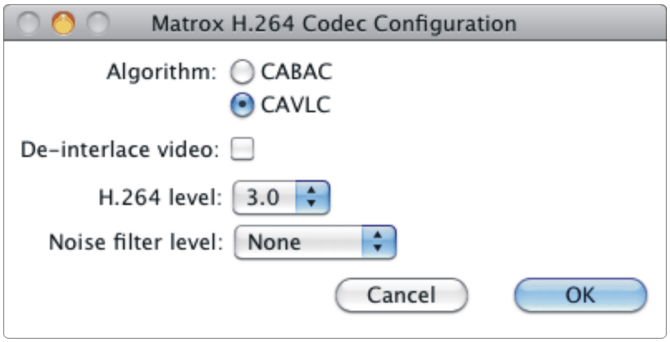
1. In Media Encoder, add the source clip or sequence to the queue, right-click the entry, and then click **Export Settings**.

Tip You can use an existing **Matrox MAX** preset as a starting point for your new preset by selecting the desired preset from the **Preset** list before specifying your export settings.

2 In the **Export Settings** window, under **Export Settings**, select **QuickTime** from the **Format** list.

3 In the **Video** pane, under **Video Codec**, select **Matrox MAX H.264** from the **Video Codec** list, and then click **Codec Settings**.

4 In the **Matrox MAX H.264 Codec Settings** window, set the following options:



– Select the entropy coding **Algorithm** to be used during compression:

- **CABAC** Uses the CABAC coding method, and defines the video stream as H.264 Main profile.
- **CAVLC** Uses the CAVLC coding method, and defines the video stream as H.264 Main profile when **Frame Reordering** (under **Advanced Settings**) is selected. Otherwise, the video stream is defined as H.264 Baseline profile. This method is not supported when encoding to a frame size that has a width greater than 720. In this case, CABAC will always be used for encoding.

– **De-interlace video** Select this option if your source video is interlaced and you want to de-interlace your video before encoding. This option can be used to display your encoded video on a monitor that displays lines progressively, such as an LCD or computer monitor. For all other instances, make sure this option is not selected.

– Select the **H.264 level** that you want to be used to encode your video.

H.264 level	Maximum Frame size	Maximum Frame rate (fps)	Maximum Data rate (Mb/s)
2.0	352×288	29.97	2
3.0	720×576	29.97	10
3.1	1280×720	29.97	14

H.264 level	Maximum Frame size	Maximum Frame rate (fps)	Maximum Data rate (Mb/s)
4.0	1920×1080	29.97	20
4.1	1920×1080	29.97	50
4.2	1920×1080	59.94	50

– Select the **Noise filter level** that will be applied to your video before encoding. Increasing the noise filter level reduces the amount of high frequencies in your source video by softening the high-detail portions of your video. Since high frequencies require more bits to encode, increasing the noise filter level leaves more bits available for the encoding of other frames, which can improve the overall quality of your encoded video. However, if you lose too much detail in your encoded video you may need to decrease the noise filter level.

5 Click **OK** to save and close the **Matrox MAX H.264 Codec Settings** window.

6 In the **Export Settings** window, in the **Video** pane, under **Bitrate Settings**, enable the **Limit data rate to** option and enter a value if you're using the CAVLC entropy coding algorithm (see step 4). If using CABAC, you can enable or disable this option.

7 For optimal results when encoding using the Matrox MAX H.264 codec, in the **Video** pane, under **Basic Settings**, select **Progressive** from the **Field Type** list.

8 Specify any other export settings as desired. For detailed information on Media Encoder settings, see your Media Encoder documentation.

Note To export a clip for use with Apple iPod or iPhone devices, you must choose AAC (advanced audio coding) as your export audio file format.

9 In the **Export Settings** window, under **Export Settings**, click the **Save Preset** button next to the **Preset** list.

10 Type a descriptive name for your preset, and then click **OK**.

Using Final Cut Pro, QuickTime Pro, or other QuickTime-based applications

This section details how to specify the Matrox MAX H.264 compression settings in Final Cut Pro and QuickTime Pro v7.6.x for delivering QuickTime files for the web and mobile devices. The settings described in this section are the same when exporting to QuickTime from other QuickTime-based video applications, such as Telestream Episode. If using Final Cut Pro version 7 or later, you can assign the

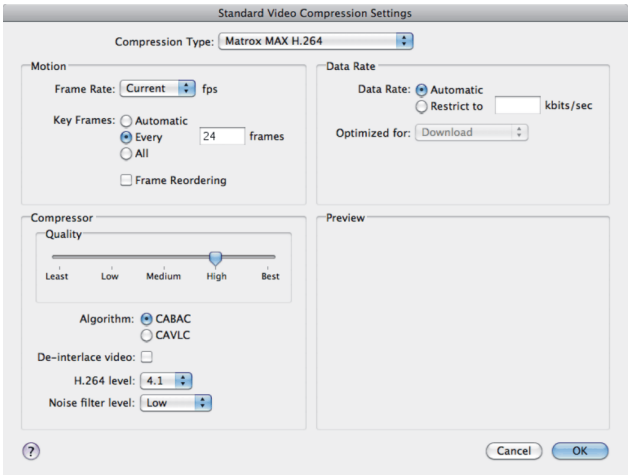
Matrox MAX H.264 settings from Apple Compressor directly to your clip or sequence in Final Cut Pro for exporting H.264 files for Blu-ray Disc and other QuickTime files.

Specifying settings for exporting to QuickTime in Final Cut Pro and QuickTime applications

This section details how to specify Matrox MAX H.264 compression settings in Final Cut Pro and QuickTime Pro v7.6.x for delivering QuickTime files for the web, and for use with Apple TV, iPod, iPhone, and other QuickTime-based devices. The encoded file's extension will be *.mov*. The settings described in this section are the same when exporting to QuickTime from other QuickTime-based video applications, such as Telestream Episode. For details on how to export to QuickTime from another QuickTime-based application, see your application's documentation.

Note If using Final Cut Pro version 7 or later, you can assign a Matrox MAX H.264 Compressor setting directly to your Final Cut Pro clip or sequence for delivering H.264 files for Blu-ray, the web, and mobile devices (see "Assigning a Matrox MAX H.264 Compressor setting in Final Cut Pro" on page 117).

1. Open Final Cut Pro or QuickTime Pro, and open the project/video file that you want to export.
2. Choose **File > Export**, and if using Final Cut Pro, click **Using QuickTime Conversion**.
3. In the **Save** window, click **Options**.
4. In the **Movie Settings** window, under **Video**, click **Settings**.



5. From the **Compression Type** menu, select **Matrox MAX H.264**.

6 Under **Motion** and **Data Rate**, select your desired settings as explained in your Final Cut Pro or QuickTime Pro documentation.

Remarks

– If using the CABAC entropy coding algorithm (see step 8), you can use either the **Automatic** or **Restrict to** data rate option. If using CAVLC, you must use the **Restrict to** data rate option.

– The **Restrict to** data rate option applies to the video portion of your encoded file only. When factoring in the encoded audio, the overall data rate for your encoded file may exceed the specified data rate limit. To minimize the impact of the audio on the overall data rate, select AAC as the audio format for your encoded file (see step 13).

7 Under **Compressor**, if **Automatic** was selected as the **Data Rate**, set the **Quality** level for your encoded video. Your video is compressed at the specified quality setting with no regard to data rate. Your desired quality is delivered on each frame at the lowest data rate possible, depending on the complexity of the video.

8 Select the entropy coding **Algorithm** to be used during compression:

– **CABAC** Uses the CABAC coding method, and defines the video stream as H.264 Main profile.

– **CAVLC** Uses the CAVLC coding method, and defines the video stream as H.264 Main profile when **Frame Reordering** is selected. Otherwise, the video stream is defined as H.264 Baseline profile.

Note CAVLC is not supported when encoding to a frame size that has a width greater than 720. In this case, CABAC will always be used for encoding.

9 If your source video is interlaced and you want to de-interlace your video before encoding, select **De-interlace video**. This option can be used to display your encoded video on a monitor that displays lines progressively, such as an LCD or computer monitor. For all other instances, make sure this option is not selected.

Important If your interlaced video is being scaled, either because you applied an effect in your project or specified a different compression frame size, don't use this option. Instead, use the **Deinterlace Source Video** option in the **Export Size Setup** window to de-interlace your video. You'll be able to do this when specifying the frame size for your encoded video in step 14.

10 Select the **H.264 level** that you want to be used to encode your video.

H.264 level	Maximum Frame size	Maximum Frame rate (fps)	Maximum Data rate (Mb/s)
2.0	352×288	29.97	2
3.0	720×576	29.97	10
3.1	1280×720	29.97	14
4.0	1920×1080	29.97	20
4.1	1920×1080	29.97	50
4.2	1920×1080	59.94	50

Note Use H.264 level 3.1 to create HD video for use with Apple iPad.

11 Select the **Noise filter level** that will be applied to your video before encoding. Increasing the noise filter level reduces the amount of high frequencies in your source video by softening the high-detail portions of your video. Since high frequencies require more bits to encode, increasing the noise filter level leaves more bits available for the encoding of other frames, which can improve the overall quality of your encoded video. However, if you lose too much detail in your encoded video you may need to decrease the noise filter level.

12 Click **OK**.

13 In the **Movie Settings** window, under **Sound**, click **Settings** to specify your audio settings, and then click **OK.**

Remarks

- When limiting the data rate of your encoded file to a specified bit rate (see step 6), please note that the encoded audio may cause the overall data rate to exceed the data rate limit. To minimize the impact of the encoded audio on the overall data rate, select AAC as the audio format for your encoded file. To do this, in the **Sound Settings** window, select **AAC** from the **Format** list.
- To export a clip for use with Apple iPod or iPhone devices, you must choose AAC (advanced audio coding) as your export audio file format. To do this, in the **Sound Settings** window, select **AAC** from the **Format** list.

14 In the **Movie Settings** window, click **Size** and select the frame size that you want for your encoded video from the **Dimensions** menu.

Note The minimum frame size is 64×64, and the maximum frame size depends on the H.264 level selected in step 10. The horizontal and vertical values must be even numbers.

15 Once all settings are specified, click **OK**, and then **Save** in the **Save** window to encode your video.

Assigning a Matrox MAX H.264 Compressor setting in Final Cut Pro

If using Final Cut Pro version 7 or later, you can assign a Matrox MAX H.264 Compressor setting to your Final Cut Pro clip or sequence to export H.264 files for Blu-ray, the web, and other mobile devices. Final Cut Pro's Share function lets you use any of the predefined Matrox MAX H.264 Compressor settings that are installed with your MXO2 software, and any custom Matrox MAX H.264 settings that you create in Compressor (see "Creating a custom Matrox MAX H.264 setting" on page 104). For detailed information on Final Cut Pro- or Compressor-related subjects, see your application's documentation.

The Matrox MAX H.264 Blu-ray settings encode video only. Audio is not encoded by the Matrox MAX H.264 codec when creating H.264 elementary streams for Blu-ray. To include audio when exporting to Blu-ray format, you must assign a separate audio setting to your source media file. However, audio is encoded by the Matrox MAX H.264 codec when creating QuickTime files for the web and mobile devices.

Note When selecting a predefined Matrox MAX H.264 setting, any modifications made to your source video's frame size in your application must be taken into consideration. For example, if your source video was cropped in your application, your source video's frame size is the cropped frame size and not the original frame size.

The predefined Matrox MAX H.264 settings that are installed with your MXO2 software are located in Compressor's **Settings** window, under **Custom > Matrox MAX H.264 Settings**. The predefined Matrox MAX H.264 settings are separated into three folders: Blu-ray, Fast Encode, and High-Quality:

- **Blu-ray** Use these settings for all Blu-ray deliverables. The encoded file's extension will be *.264*.

Note For compatibility with most Blu-ray players and Adobe Encore CS5, the predefined Matrox MAX H.264 settings for Blu-ray use a simple GOP structure.

- **Fast Encode** Use these settings for fast encoding of QuickTime files. These settings leverage your system's resources with the MXO2 hardware, resulting in even faster encoding times. The encoded file's extension will be *.mov*.

- **High-Quality** Use these settings for high-quality encoding of QuickTime files. With these settings, the encoding is performed entirely by the MXO2 hardware, which frees your system's resources for other tasks. The encoded file's extension will be *.mov*.

⇨ **To assign a Matrox MAX H.264 setting:**

1. In Final Cut Pro, select the clip or sequence that you want to export.
2. Choose **File > Share**.
3. In the **Share** window, select **Other** from the **Output Type** menu. This opens the **Settings** window that contains the Compressor settings.
4. In the **Settings** window, select the desired **Matrox MAX H.264** setting.
5. If you're exporting to Blu-ray format and you want to export audio as well, you must add a separate output for audio in the **Share** window, and then assign an audio setting to that output. Matrox provides predefined audio settings for each of the Matrox settings, however, you can choose to use another audio setting.
6. **Export** the output(s) as you would normally.

11

Using Matrox Vetura Capture and Vetura Playback

This chapter explains how to use the Matrox Vetura Capture and Vetura Playback applications to capture and play back clips.

Matrox Vetura Capture

The Matrox Vetura Capture stand-alone application gets installed with your MXO2 software. Through the use of your MXO2 hardware's inputs, Vetura Capture lets you capture video clips with up to 16 channels of audio, including AFD and closed caption data. You can use any codec that is installed on your system to capture your clips. The captured clips are saved as *.mov* files, and can be played back using a video application, such as Apple Final Cut Pro, Adobe Premiere Pro, or Matrox Vetura Playback. Vetura Capture also features video and audio passthrough. This lets you monitor the video and audio from your input source using the MXO2 outputs.

Capturing AFD and closed caption data

If you have an SDI video source that contains AFD and closed caption data in the VANC (vertical ancillary data space), Vetura Capture can capture the AFD and closed caption data along with your video using MXO2's Matrox 4VANC tool. When Matrox 4VANC capture is enabled in your MXO2 preferences window, Vetura Capture will automatically capture the AFD and closed caption data from your source video's VANC using SDI audio tracks 15 and 16 respectively. For information on how to enable Matrox 4VANC capture in the MXO2 preferences window, see "Matrox 4VANC capture and playback" on page 70.

Important To capture AFD and closed caption data, the **Capture video only** option must be disabled, and you must have 16 audio tracks enabled (see "Setting the Vetura Capture preferences" on page 122).

Once captured, the Matrox 4VANC audio tracks that contain the AFD and closed caption data can then be used in a video application, such as Final Cut Pro, Premiere Pro, or Matrox Vetura Playback, to play back the AFD and closed caption data through MXO2's SDI output.

Supported codecs

You can use any of the codecs that are installed on your system to capture your clip using Vetura Capture. However, how well a codec performs depends on your system's CPU speed and storage size. To play back the captured clip on another system, the same codec that was used to capture the clip must be installed on the system.

Note The Matrox MAX H.264 codec is not supported for capture with Vetura Capture.

Starting Vetura Capture

1. In the **Finder** menu, choose **File > New Finder Window**.
2. Choose **Applications > Matrox MXO2 Utilities**, and double-click **Matrox Vetura Capture**.

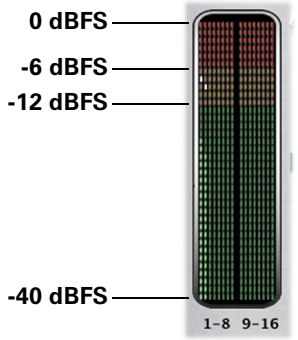
Capturing a clip

You can capture a clip using any codec that is installed on your system. A captured clip is saved as a *.mov* file.

1. Connect the video and audio source that you want to capture to the corresponding input on your MXO2 hardware.
2. Set the A/V input settings in the MXO2 preferences window (see Chapter 7, “Configuring Your MXO2 System”).
3. To capture AFD and closed caption data, enable the corresponding Matrox 4VANC capture option in the MXO2 preferences window (see “Capturing AFD and closed caption data” on page 120).
4. Start Matrox Vetura Capture, and set your capture settings as described in “Setting the Vetura Capture preferences” on page 122.

5. To adjust the audio gain for the audio tracks in your source video for capture, show the audio levels by clicking the **Volume Control** button ( ), and use the sliders to adjust the levels. Use the digital audio meter to monitor the audio levels for each audio track. Audio levels over 0 dBFS will be clipped

during capture, so make sure to set the audio levels accordingly. Click the **Reset** button ( ) to set all audio levels to the original values.



6 Click the **Record** button ( ) to start your capture. To stop capturing, press **ESC** or click the record button again.

Remarks

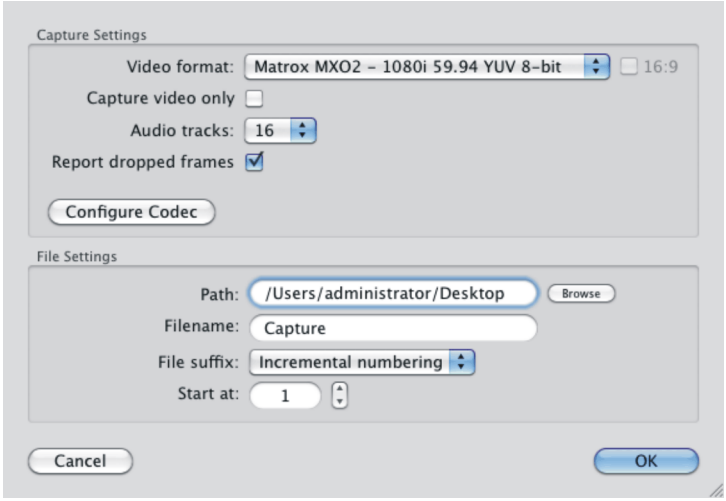
- While capturing, the MXO2 inputs and outputs will not be available to any other application.
- If you're overwriting an existing file, make sure that the file is not being used by another application before performing your capture. You must close the file and the application that you used to view the file before capturing.

Setting the Vetura Capture preferences

The Vetura Capture preferences are the global settings that are loaded when you start Vetura Capture.

Note The Vetura Capture preferences are not available during capture.

1 Start Matrox Vetura Capture, and choose **Matrox Vetura Capture > Preferences**.



Tip You can press **COMMAND+COMMA** to open the preferences window.

2 Under **Capture Settings**, set the following options:

– **Video format** Select the video format that you want for your captured video. The selected format must either match the format of your source video, or if you want to scale your source video, the selected format must have a frame rate that is compatible to your source video. If you selected an NTSC or PAL video format, select **16:9** for anamorphic 16:9 material.

Important If your source video will be scaled for capture, you must enable **Scale input for capture** and set your **Scaling** options on the **A/V Input** pane of the MXO2 preferences window (see Chapter 7, "Configuring Your MXO2 System").

– **Capture video only** Select this option if you want to capture your video clip with no audio tracks.

Note You will not be able to capture AFD and closed caption data when this option is selected.

– **Audio tracks** Select the number of audio tracks that you want to capture.

Note You must have 16 audio tracks enabled in order to capture AFD and closed caption data.

– **Report dropped frames** If this option is selected and one or more frames are dropped during capture, Vetura Capture will stop the capture and display a message. If this option is not selected, Vetura Capture will

not stop capturing if one or more frames are dropped, and a dropped frames message will not be displayed.

– **Configure Codec** Click to select and configure the codec that you want to use for your capture. The options that appear are specific to the selected codec. For more information, see your QuickTime documentation.

Remarks

- You can open the **Compression Settings** window by pressing **COMMAND+D**.
- If you don't have a full-raster HD codec installed on your system, Matrox provides the Matrox MPEG-2 I-frame codec that you can use to capture SD/HD material. For information on using the Matrox MPEG-2 I-frame codec and its options, see "Using the Matrox MPEG-2 I-frame codec" on page 125. To play back the captured video file on another system, the same codec that was used to capture the video must be installed on that system.
- The Matrox MAX H.264 codec is not supported for capture with Vetura Capture.

3 Under **File Settings**, set the following options:

– **Path** Specify the destination where all captured videos will be saved.

– **Filename** Specify the filename for your captured video.

– **File suffix** Select the type of file suffix that is added at the end of the specified filename when saved.

- **None** No suffix is added. The file is saved with the specified filename only.
- **Incremental numbering** Adds the number specified as the **Start at** number, at the end of the filename. This number increments by one after every capture. For example, if **Start at** is set to 8 and the filename is *Capture*, this option saves the file as *Capture+008*. The next capture file is saved as *Capture+009*, and so on.
- **Date and time** Adds the current date and time at the end of the filename, in the form YYYY-MM-DD HH.MM.SS. For example, if the capture is taken on January 4, 2010 at 11:08:01, and the filename is *Capture*, the file is saved as *Capture 2010-01-04 11.08.01*.

4 Click **OK** to apply your settings.

Using the Matrox MPEG-2 I-frame codec

The Matrox MPEG-2 I-frame codec is a full-raster HD codec that gets installed automatically when you install your MXO2 software. It is included primarily for users who do not have a full-raster HD codec installed on their system.

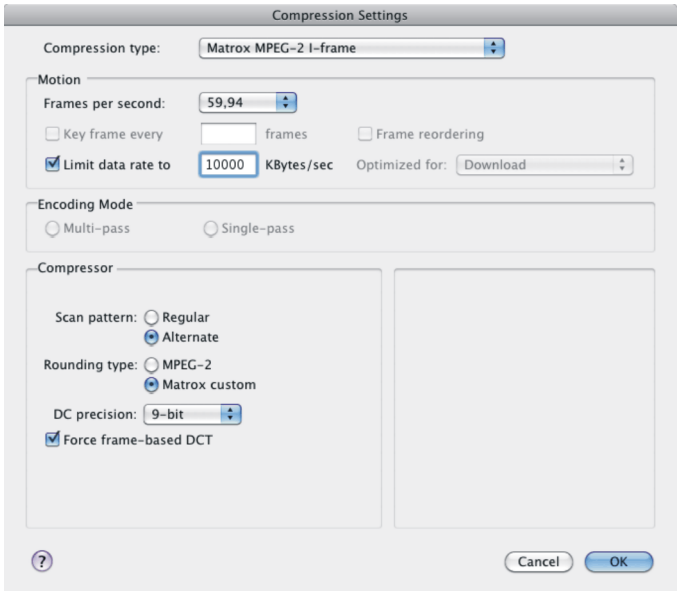
To capture SD/HD video using the Matrox MPEG-2 I-frame codec, the MXO2 software must be installed on your system, and the MXO2 hardware must be connected.

If the captured video will be played back on another system, the Matrox MPEG-2 I-frame codec must be installed on that system as well. You can download the Matrox MPEG-2 I-frame codec for playback on other Mac systems from the Download section of our Support website at www.matrox.com/video/support.

Configuring the Matrox MPEG-2 I-frame codec

Use the settings described in this section to configure the Matrox MPEG-2 I-frame codec.

1 From the **Compression type** list, select **Matrox MPEG-2 I-frame**.



2 Under **Motion**, select the frame rate for your captured video in **Frames per second**, and enter a target data rate in the **Limit data rate to** box.

Note The data rate must be between 10 Mb/s (975 KB/s) and 300 Mb/s (36621 KB/s) for SD material, and 50 Mb/s (6100 KB/s) and 300 Mb/s for HD material.

3 To apply advanced compression settings, set the options under **Compressor**. The default settings for the advanced options provide good results for most applications. We recommend that you change these settings only when needed for special purposes.

- Select your desired **Scan pattern**:
  - **Regular** Sets the regular zig zag scanning pattern of the AC coefficient of the DCT block as defined in the ISO/IEC 13818-2 (figure 7-2) specification document.
  - **Alternate** Sets the alternate zig zag scanning pattern of the AC coefficient of the DCT block as defined in the ISO/IEC 13818-2 (figure 7-3) specification document. Use this setting when capturing video at a high data rate.
- Select your desired **Rounding type**:
  - **MPEG-2** Rounds the AC coefficient up to the nearest whole number when calculating the quantization coefficient.
  - **Matrox custom** Truncates the AC coefficients to the lowest whole number when calculating the quantization coefficient. In some cases, this setting may yield less artifacts in graphics.
- From the **DC precision** list, select the bit-depth precision of the DC intra block. The higher the DC precision value that's used to render your video, the more likely that the DC content will be increased at the expense of the AC content in the encoded stream. This may result in lowering the overall quality of the compressed stream at a specified data rate.
- Select the **Force frame-based DCT** setting to render macroblocks as frames rather than as fields. In some cases, graphics will yield less artifacts if this option is selected.

4 Click **OK** to save your settings.

Keyboard shortcuts

This section lists the keyboard shortcuts when working with Matrox Vetura Capture.

Action	Keyboard Shortcut
Open preferences window	**COMMAND+COMMA**
Open Compression Settings window	**COMMAND+D**
Stop capture	**ESC**

Matrox Vetura Playback

The Matrox Vetura Playback stand-alone application gets installed with your MXO2 software. Through the use of standard controls, Vetura Playback lets you play back *.mov* clips with up to 16 channels of audio, and output the clips using your MXO2 hardware. You can also use Vetura Playback to take a high-quality snapshot of any frame of your video.

Playing back Matrox 4VANC data

If your clip contains Matrox 4VANC closed captioning and Matrox 4VANC AFD data, Vetura Playback will play back the closed caption and AFD data when playing back your clip. For information on playing back Matrox 4VANC data, see "Audio controls and Matrox 4VANC data" on page 131.

Supported files and video formats

Matrox Vetura Playback supports playback of *.mov* files, including *.mov* files created using the Matrox MAX H.264 codec (see Chapter 10, "Using the Matrox MAX H.264 Codec"), provided that the associated codecs are installed on your system. For a list of the supported project video formats, and video output formats for the MXO2 main and SD channels, see Appendix D, "Matrox MXO2 Supported Output Formats."

Starting Vetura Playback

1. In the **Finder** menu, choose **File > New Finder Window**.
2. Choose **Applications > Matrox MXO2 Utilities**, and double-click **Matrox Vetura Playback**.

Note The Matrox Vetura Playback interface (see "Using the Vetura Playback interface" on page 128) does not appear until you load a video file.

Loading and playing back a clip

When you load an *.mov* file, the Vetura Playback interface opens with the selected file. Up to a maximum of four clips can be open at any given time, with each clip displayed in its own interface. However, you'll be able to play back and output the clip in the active interface only.

1. Start Matrox Vetura Playback, and choose **File > Open** or **Open Recent**.

Note If the list of recently opened files does not appear when you select **Open Recent**, you must set the option in your operating system. To do so, from the **Apple** menu, click **System Preferences**, and then click **Appearance**. In the **Appearance** window, under **Number of Recent Items**, select any setting from the **Documents** menu other than **None**.

2. Select the desired *.mov* file, and then click **Open** if required. The Matrox Vetura Playback interface appears with your selected video file.

3 Use the Vetura Playback interface controls to play back your clip (see "Using the Vetura Playback interface" on page 128).

4 To output your clip using the MXO2 outputs, set the appropriate video and audio output settings in the MXO2 preferences window (see Chapter 7, "Configuring Your MXO2 System").

Using the Vetura Playback interface

Vetura Playback includes standard controls for navigating and playing back your clips, and also for taking frame grabs. This section details the different controls found on the Vetura Playback interface. The controls described in this section can also be accessed from the **Play Control** menu, or by using the keyboard shortcuts (see "Keyboard shortcuts" on page 137.)

Playback controls

Playback controls let you play back and navigate through your clip.

Go to In Point / Go to Out Point Cues the playhead to the designated In/Out point. If no In/Out point is defined, the playhead moves to the first/last frame of your clip.

Rewind / Fast Forward Click to search your clip from the playhead's current position starting at a speed of 2x normal speed, and click again to search at a faster speed up to 8x. The speed and direction are relative to the current search speed and direction (1x/2x/4x/8x). For example, if fast forwarding at a speed of 4x, press the **Rewind** button twice to fast forward at a speed of 1x. Press **Rewind** again to begin rewinding at a speed of 1x, and so on. Press the **Stop** button to stop searching.

Go to Previous Frame / Go to Next Frame Moves the playhead to the previous/next frame relative to the playhead's current position.

Play / Stop Plays the video from the playhead's current position to the last frame of the video. If your video is currently playing back, the **Play** button ( ) changes to a **Stop** button ( ). Click the **Stop** button to stop the current playback. See also **Play In to Out** and **Loop Playback**.

Play In to Out Plays the video from the designated In point to the designated Out point. If no In/Out point is defined, your video plays from the first frame to the last frame. Click the **Stop** button to stop the current playback.

Set In Point / Set Out Point Sets the In/Out point to the playhead's current position. The In and Out points define the active video portion of your clip. Portions of video that fall outside the In and Out points (inactive video) are not played back by Vetura Playback.

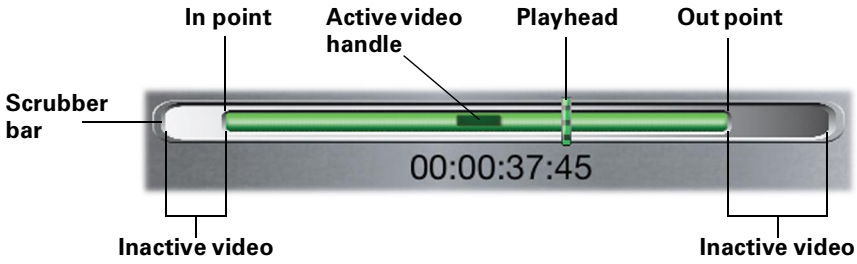
You can also set the In and Out points by typing the desired position in the corresponding timecode boxes. Click in the corresponding box, press **TAB** to go to the hour, minute, second, and frame fields, and then press **ENTER** to accept the value, or **ESC** to revert to the previously-entered value. To choose between drop frame and non-drop frame timecode, see "Setting the Vetura Playback preferences" on page 133.

Loop Playback When loop ( ) is enabled, your playback is looped and will continue to play back until stopped. Depending on the play method chosen (**Play** or **Play In to Out**), playback will be from the first frame to the last frame, or from the designated In point to the designated Out point.

Jog Control Drag the jog control left or right to navigate within your clip.

Note You can also drag the playhead to navigate through your clip (see "Playhead and scrubber bar" on page 130).

Playhead and scrubber bar



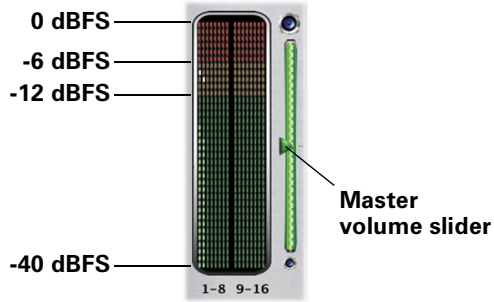
The playhead shows the location of the currently displayed frame within your clip. The timecode of the playhead's current position is displayed just below the scrubber bar.

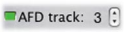
The active video portion of your clip, that is, the portion of video that will be played back, is defined by the In and Out points and is shown in green. The portions of video that fall outside the specified In and Out points are considered inactive video and will not be played back by Vetura Playback. You can set/adjust the In and Out points on the scrubber bar by dragging the left or right end of the green (active video) portion of your clip. To adjust the In and Out points while maintaining the active video duration, use the active video handle to drag the entire active video segment left or right.

To navigate to a specific location within your clip using the scrubber bar, click to the desired location in your clip, or drag the playhead to the desired location. For more options on navigating through your clip, see "Playback controls" on page 128 and "Keyboard shortcuts" on page 137.

Audio controls and Matrox 4VANC data

Audio meter and master volume When audio is enabled, the digital audio meter lets you monitor the audio level for up to 16 audio channels. The master volume slider allows you to set the audio level during playback. The dBFS levels are as shown below:



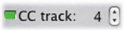


AFD track If your clip contains Matrox 4VANC AFD (active format description) data, Vetura Playback will play back the AFD data along with the video for output on MXO2, MXO2 Rack, and MXO2 LE. In order to output AFD data, the data must be on audio track 15. If the AFD data in your clip was not assigned to audio track 15 when the file was exported from Final Cut Pro (see "Settings for capturing Matrox 4VANC AFD" on page 90), you must indicate which audio track contains the AFD data. To do so, enable **AFD track** by clicking the LED, and select the audio track in your *.mov* file that contains the Matrox 4VANC AFD data.

When this option is enabled, Vetura Playback retrieves the AFD data from the specified track and re-assigns it to audio track 15. As a result, any audio track that comes after the specified track will shift down by one track number. The number of available tracks are limited to the number of audio tracks that are in your clip.

To output AFD data from MXO2's SDI output, set the appropriate settings as explained in "Matrox 4VANC AFD capture and playback" on page 70."

Any changes that you make to this option in the Vetura Playback interface will override the AFD data settings in the Vetura Playback preferences (see "Setting the Vetura Playback preferences" on page 133).



CC track If your clip contains Matrox 4VANC closed captioning, Vetura Playback will play back the closed captioning along with the video for output on MXO2, MXO2 Rack, and MXO2 LE. In order to output closed captioning, the closed caption data must be on audio track 16. If the closed caption data in your clip was not assigned to audio track 16 when the file was exported from Final Cut Pro (see "Settings for exporting Matrox 4VANC closed captioning" on page 89), you must indicate which audio track contains the closed caption data. To do so, enable **CC track** by clicking the LED, and select the audio track in your *.mov* file that contains the Matrox 4VANC closed caption data.

When this option is enabled, Vetura Playback retrieves the closed caption data from the specified track and re-assigns it to audio track 16. As a result, any audio track that comes after the specified track will shift down by one track number. The number of available tracks are limited to the number of audio tracks that are in your clip.

To output closed captioning from MXO2's SDI or analog output, set the appropriate settings as explained in "Matrox 4VANC closed caption capture and playback" on page 72."

Note Any changes that you make to this option in the Vetura Playback interface will override the closed captioning settings in the Vetura Playback preferences (see "Setting the Vetura Playback preferences" on page 133).

Mute Audio Playback Enables or disables audio for playback. Vetura Playback can play back up to 16 channels of audio.

Note If playing back a clip with closed captioning or AFD data, audio playback must be enabled.

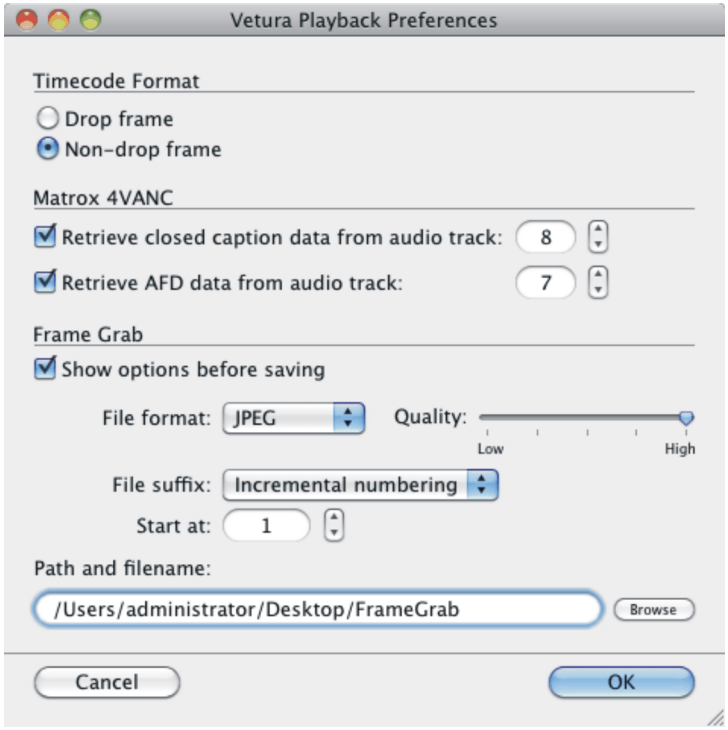
Frame Grab

Frame Grab Takes a snapshot of the current frame. For information on how to take a frame grab, see "Taking a frame grab" on page 136.

Setting the Vetura Playback preferences

The Vetura Playback preferences are the global settings for timecode format, Matrox 4VANC data, and frame grabs, that are loaded when an *.mov* clip is opened.

1 Start Matrox Vetura Playback, and choose **Matrox Vetura Playback > Preferences**.



2 Under **Timecode Format**, select the format to be used for the timecodes that appear in Vetura Playback. Vetura Playback uses SMPTE standard timecode represented in hours, minutes, seconds, and frames (HH:MM:SS:FF).

– **Drop frame** This format is a timecode option for 29.97 and 59.94 fps video only. Because a timecode is represented in whole frames, drop frame timecode compensates for the difference between the timecode count and your video's actual playing time by periodically dropping frames from the timecode counter. This results in a timecode count that matches your video's actual playing time. Vetura Playback displays drop frame timecode with a semicolon (;) between the seconds and frames fields (HH:MM:SS;FF).

– **Non-drop frame** This format counts without dropping any frames from the timecode counter. This format is a timecode option for all frame rates, including 29.97 and 59.94 fps. Vetura Playback displays non-drop frame timecode with a colon (:) between the seconds and frames fields (HH:MM:SS:FF).

3 If your clip contains Matrox 4VANC closed captioning, Vetura Playback will play back the closed captioning along with the video for output on MXO2, MXO2 Rack, and MXO2 LE. In order to output closed captioning, the closed caption data must be on audio track 16. If the closed caption data in your clip was not assigned to audio track 16 when the file was exported from Final Cut Pro (see "Settings for exporting Matrox 4VANC closed captioning" on page 89), you must indicate which audio track contains the closed caption data. To do so, under **Matrox 4VANC**, select **Retrieve closed caption data from audio track**, and select the audio track in your *.mov* file that contains the Matrox 4VANC closed caption data.

When this option is enabled, Vetura Playback retrieves the closed caption data from the specified track and assigns it to audio track 16. As a result, any audio track that comes after the specified track will shift down by one track number. The number of available tracks are limited to the number of audio tracks that are in your clip.

To output closed captioning from MXO2's SDI or analog output, set the appropriate settings as explained in "Matrox 4VANC closed caption capture and playback" on page 72."

Note Any changes that you make to the closed captioning option in the Vetura Playback interface (see "Audio controls and Matrox 4VANC data" on page 131) will override the settings in the Vetura Playback preferences.

4 If your clip contains Matrox 4VANC AFD (active format description) data, Vetura Playback will play back the AFD data along with the video for output on MXO2, MXO2 Rack, and MXO2 LE. In order to output AFD data, the data must be on audio track 15. If the AFD data in your clip was not assigned to audio track 15 when the file was exported from Final Cut Pro (see "Settings for capturing Matrox 4VANC AFD" on page 90), you must indicate which audio track contains the AFD data. To do so, under **Matrox 4VANC**, select **Retrieve AFD data from audio track**, and select the audio track in your *.mov* file that contains the Matrox 4VANC AFD data.

When this option is enabled, Vetura Playback retrieves the AFD data from the specified track and re-assigns it to audio track 15. As a result, any audio track that comes after the specified track will shift down by one track number. The number of available tracks are limited to the number of audio tracks that are in your clip.

To output AFD data from MXO2's SDI output, set the appropriate settings as explained in "Matrox 4VANC AFD capture and playback" on page 70."

Note Any changes that you make to the AFD option in the Vetura Playback interface (see "Audio controls and Matrox 4VANC data" on page 131) will override the settings in the Vetura Playback preferences.

5 Under **Frame Grab**, set the following options:

– **Show options before saving** If this option is selected, the frame grab options will appear when you take a frame grab. If disabled, the frame grab options won't appear, and the grabbed image will be automatically saved as specified in the frame grab options.

Note Any changes that you make to the frame grab options when taking a frame grab will be applied as new preferences in the **Matrox Vetura Playback Preferences** window.

– **File format** Select the format for the saved frame grab file.

– **Quality** For JPEG and JPEG 2000 file formats only, select the quality setting for the saved frame grab file. The lower the quality, the smaller the file size. For all other file formats, the frame grab is taken at the highest possible quality.

– **File suffix** Select the suffix that gets added at the end of the specified filename when saved.

- **None** No suffix is added. The file is saved with the specified filename only.
- **Incremental numbering** Adds the number specified as the **Start at** number, at the end of the filename. This number increments by one after every frame grab. For example, if **Start at** is set to 8 and the filename is *FrameGrab*, this option saves the file as *FrameGrab+008*. The next frame grab file is saved as *FrameGrab+009*, and so on.
- **Date and time** Adds the current date and time at the end of the filename, in the form YYYY-MM-DD HH.MM.SS. For example, if the frame grab is taken on January 4, 2010 at 11:08:01, and the filename is *FrameGrab*, the file is saved as *FrameGrab 2010-01-04 11.08.01*.

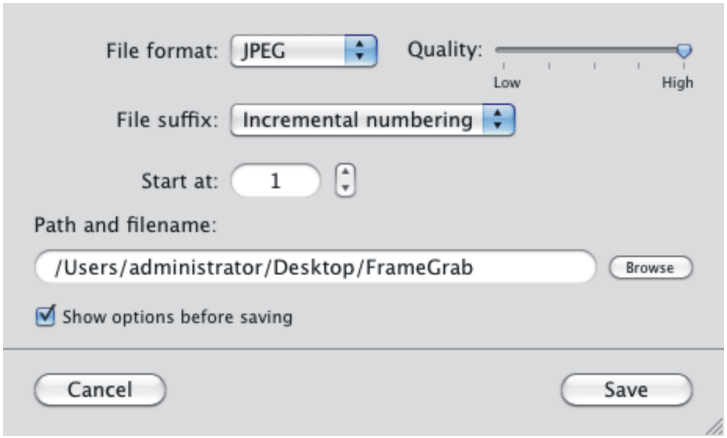
– **Path and filename** Specify the location and filename for all saved frame grab files.

6 Click **OK** to save the settings.

Taking a frame grab

Matrox Vetura Playback allows you to take a high-quality snapshot of a single frame in your video, and save the still image to your desired file format.

1. Start Matrox Vetura Playback, and load an *.mov* file (see "Loading and playing back a clip" on page 127).
2. Position the playhead on the scrubber bar so that it's on the frame that you want to grab.
3. Click the **Frame Grab** button ( ).
4. If **Show options before saving** is selected under **Frame Grab** in the Matrox Vetura Playback preferences, the frame grab options will appear.



Set the frame grab options as specified in "Setting the Vetura Playback preferences" on page 133, and then click **Save**. If **Show options before saving** is not selected, the frame grab options won't appear and the frame grab file will be automatically saved with the options specified in the Matrox Vetura Playback preferences.

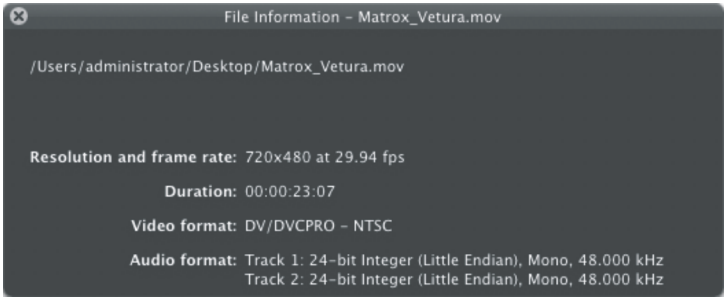
Note Any changes that you make to the frame grab options when taking a frame grab will be applied as new preferences in the **Matrox Vetura Playback Preferences** window.

Viewing file information

To view a clip's information, such as the video resolution and frame rate, video format, and audio format:

1 Start Matrox Vetura Playback, and load an *.mov* file (see "Loading and playing back a clip" on page 127).

2 Choose **Window > Show file information**.


File Information – Matrox_Vetura.mov
/Users/administrator/Desktop/Matrox_Vetura.mov
Resolution and frame rate: 720x480 at 29.94 fps
Duration: 00:00:23:07
Video format: DV/DVCPRO – NTSC
Audio format: Track 1: 24-bit Integer (Little Endian), Mono, 48.000 kHz
Track 2: 24-bit Integer (Little Endian), Mono, 48.000 kHz

Keyboard shortcuts

This section lists the keyboard shortcuts when working with Matrox Vetura Playback. For descriptions of the various actions, see "Using the Vetura Playback interface" on page 128.

Action	Keyboard Shortcut
Play	**SPACE**
Play In to Out	**CTRL+SPACE**
Stop	**SPACE** or **K**
Rewind (-1x, -2x, -4x, -8x)	**J**
Fast Forward (1x, 2x, 4x, 8x)	**L**
Go to Previous Frame	**LEFT ARROW**
Go to Next Frame	**RIGHT ARROW**
Go to In Point	**Q**
Go to Out Point	**W**
Loop Playback	**COMMAND+L**
Set In Point	**I**
Set Out Point	**O**
Mute Audio Playback	**S**
Show/Hide File Information	**COMMAND+I**

Your notes

A

Understanding Pulldown

This appendix describes the available MXO2 pulldown methods.

Overview

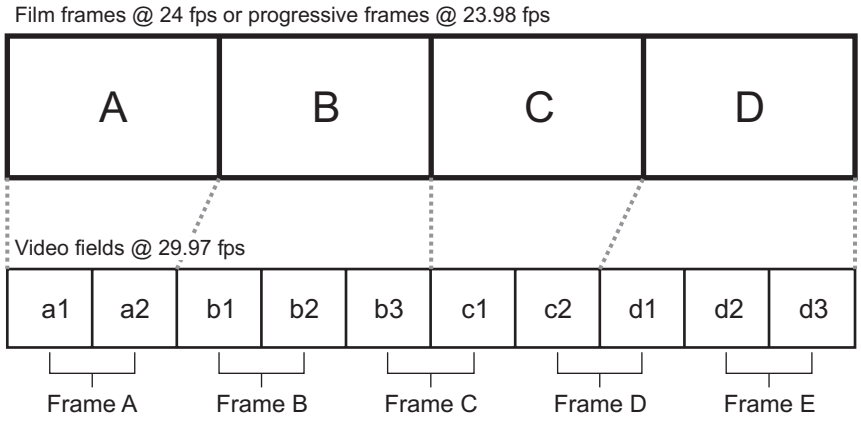
Depending on your project's video output format, a pulldown may be required to convert 23.98 fps video to 29.97 fps or 59.95 fps video for output on MXO2 (see Appendix D, "Matrox MXO2 Supported Output Formats"). When a pulldown is required for your video output, Matrox MXO2 performs either a standard 2:3:2:3 pulldown or an advanced 2:3:3:2 pulldown. You can select your desired pulldown method in MXO2's video output settings.

2:3:2:3 pulldown (standard)

2:3:2:3 pulldown, also known as standard 2:3 pulldown, is often used as part of the telecine process to transfer 24 fps film footage to 29.97 fps interlaced video. This pulldown method is also used to convert any 23.98 fps progressive video to 29.97 fps interlaced video, such as for converting 486p @ 23.98 fps video to NTSC.

In order to convert 24 fps film or 23.98 progressive video to 29.97 fps interlaced video, additional video frames, and more specifically video fields, must be created and added to the video sequence. For example, to convert a sequence of four film or progressive frames, five frames of video are needed for a total of 10 video fields. Therefore, one additional video frame or two video fields must be created. To accomplish this, the first and third frames of a four-frame film or progressive video sequence are each converted to two video fields. The second and fourth frames of the sequence are converted to three video fields to make up a total of five interlaced video frames.

The following diagram demonstrates the process:



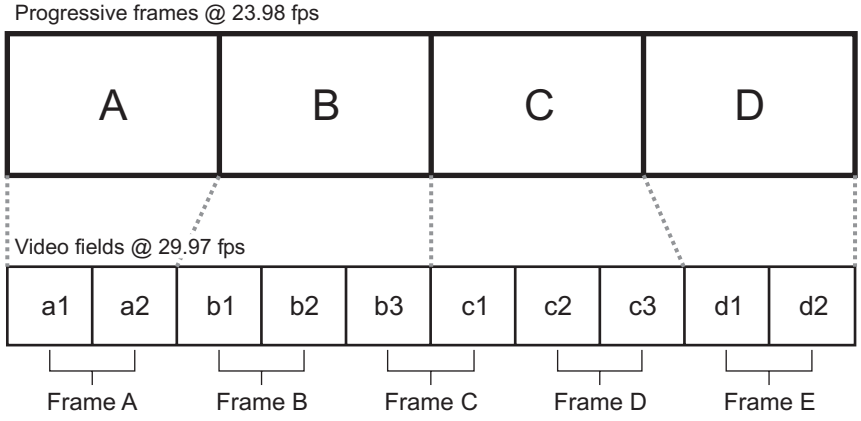
Standard 2:3:2:3 pulldown is accomplished by representing the first frame of film or progressive video (frame **A**) as two fields of video (fields **a1** and **a2**), the second frame (frame **B**) as three fields of video (fields **b1**, **b2**, and **b3**), the third

frame (frame **C**) as two fields (fields **c1** and **c2**), and the fourth frame (frame **D**) as three fields (fields **d1**, **d2**, and **d3**). This sequence repeats six times each second.

2:3:3:2 pulldown (advanced)

2:3:3:2 pulldown, also known as advanced 2:3:3:2 pulldown, was developed as an alternative to the 2:3:2:3 pulldown method for making frame rate conversions in DV video. It is used to convert 486p @ 23.98 fps video to NTSC (486i @ 29.97 fps) video. This conversion is used when video footage is acquired by a DV camera at 23.98 fps and recorded to DV tape with the recorder set for advanced pulldown (called 24PA or 24P Advanced mode on some devices). 2:3:3:2 pulldown differs from 2:3:2:3 pulldown in that the two middle frames of the video sequence are each converted to three video fields.

The following diagram demonstrates the process:



Advanced 2:3:3:2 pulldown is accomplished by representing the first frame of progressive video (frame **A**) as two fields of video (fields **a1** and **a2**), the second frame (frame **B**) as three fields of video (fields **b1**, **b2**, and **b3**), the third frame (frame **C**) as three fields (fields **c1**, **c2**, and **c3**), and the fourth frame (frame **D**) as two fields (fields **d1** and **d2**).

Your notes

B

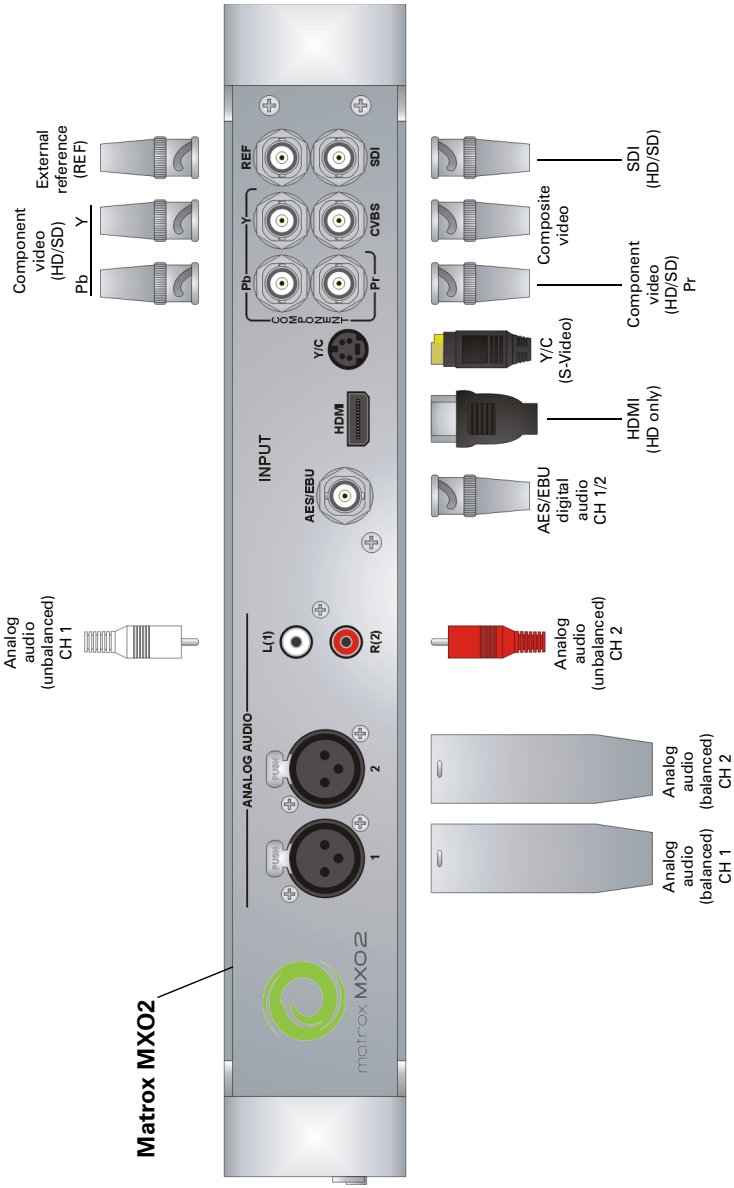
Matrox MXO2 Connectors

This appendix describes the inputs and outputs for all MXO2 products.

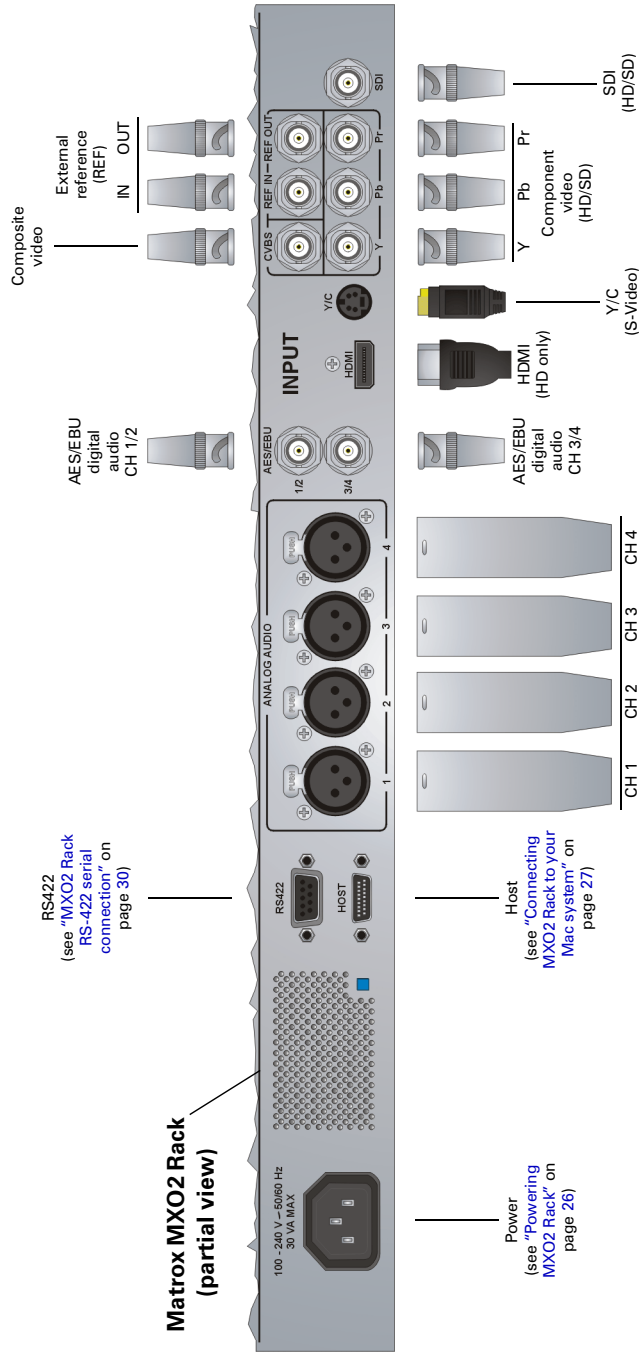
Inputs

The following sections detail the MXO2, MXO2 Rack, MXO2 LE, and MXO2 Mini inputs.

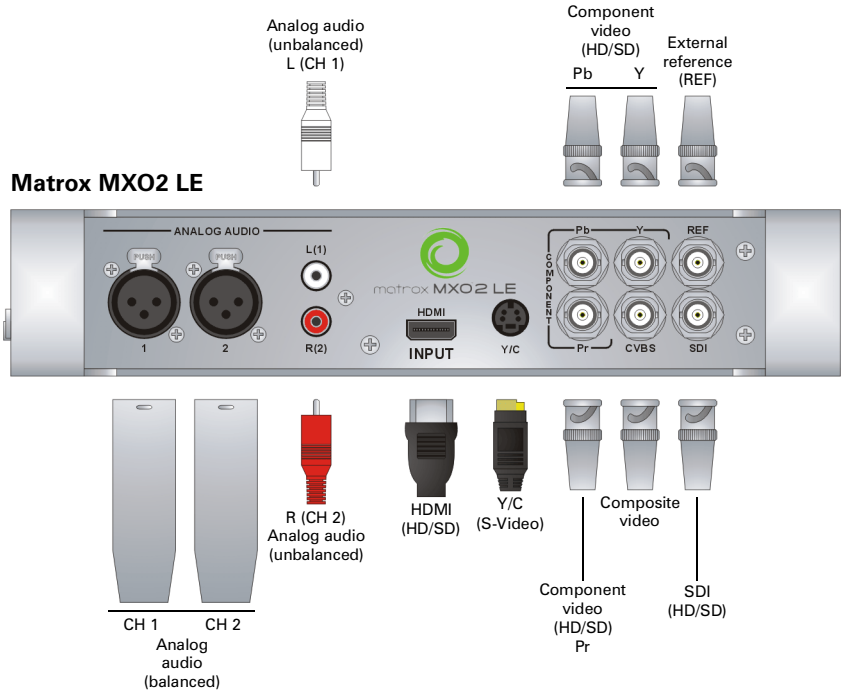
MXO2 inputs



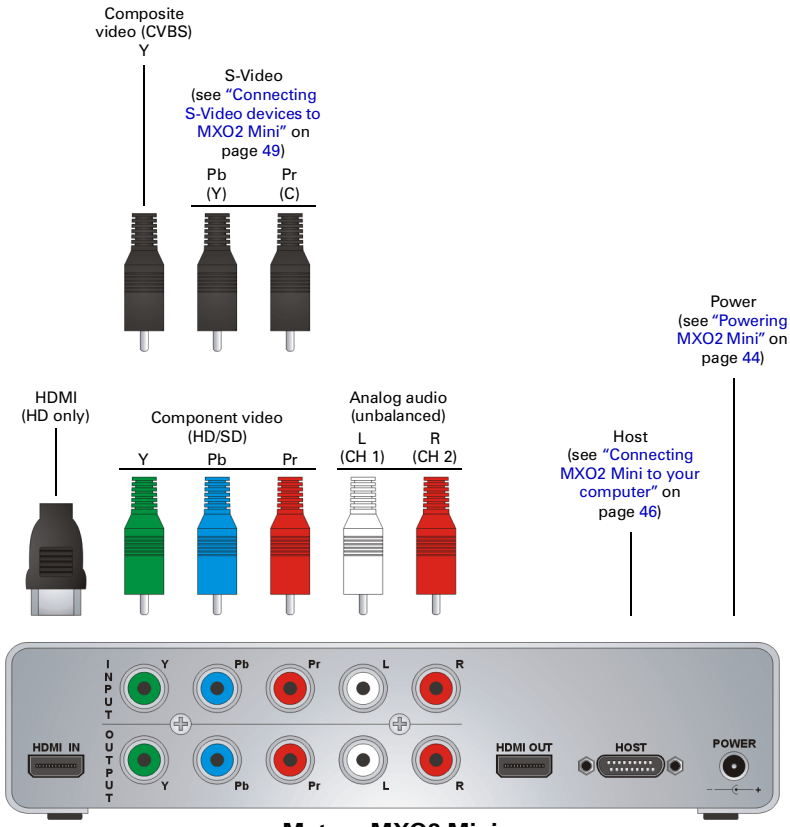
MXO2 Rack inputs



MXO2 LE inputs



MXO2 Mini inputs



Matrox MXO2 Mini

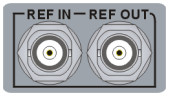
Input connector descriptions

This section describes the Matrox MXO2, MXO2 Rack, and MXO2 LE inputs. For MXO2 Mini inputs, see "Input connector descriptions (MXO2 Mini)" on page 150.

You can select the video and audio inputs to be used as your capture source in the MXO2 preferences window (see "Specifying your A/V input settings" on page 57). For a list of the supported input and capture formats, see Appendix C, "Matrox MXO2 Supported Input and Capture Formats."

Note Depending on your MXO2 hardware, some of the following connectors may not be available or may be available in a limited capacity only. Some connectors on your MXO2 hardware may not appear exactly as shown below.

(MXO2 and MXO2 LE)



(MXO2 Rack)

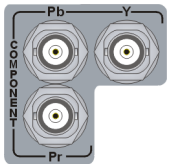
External reference (REF) Allows you to genlock all devices connected to your MXO2 system to an external genlock source (bi-level analog black burst for SD, or analog tri-level sync for HD). MXO2 Rack features an additional REF OUT connector with loop through that allows you to daisy chain the genlock reference input to another device's reference input.

Important If you connected an external genlock source to MXO2 Rack's REF IN connector, and you're not using the REF OUT connector, you must terminate the reference signal by connecting a BNC 75-ohm terminator to REF OUT.

To compensate for cable delays, timing-offset controls that align your video output relative to your external genlock source are available (see "Specifying your genlock settings" on page 56).

HDMI Provides an input for HD HDMI video (either YUV or RGB), and up to eight channels of uncompressed embedded audio, from a digital HDMI device. HDCP sources and SD video are not supported on this input. Connect a standard HDMI video/audio cable from a camera, VTR, or other video input source.

SDI Provides an input for use with a digital SDI device. This input supports HD-SDI and SD-SDI video, and up to 16 channels of embedded audio. You can also use this input to capture 720p at 23.98 VariCam material, and closed captioning and AFD data (see "Matrox 4VANC capture and playback" on page 70). Connect an SDI video/audio cable from a camera, VTR, or other video input source.



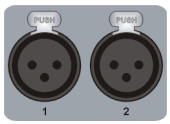
Component video (Y, Pb, Pr) Provide inputs for use with an analog component device, and support HD and SD video. Connect component Y, Pb, Pr video cables from a camera, VTR, or other video input source.

Y/C (S-Video) Provides an input for use with an analog S-Video device (SD only). Connect an S-Video cable from a camera, VTR, or other video input source.

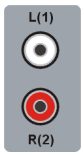
Composite video (CVBS) Allows you to input SD video from an analog NTSC or PAL device. Connect a composite video cable from a camera, VTR, or other video input source.

AES/EBU digital audio Allows you to input stereo digital audio. Connect a coaxial BNC audio cable from a camera, VTR, audio mixer, or other audio input source.

Note Not available on MXO2 LE.



Analog audio (balanced) Allows you to input balanced stereo analog audio. Connect XLR cables from a camera, VTR, audio mixer, or other audio input source.



Analog audio (unbalanced) Allows you to input unbalanced stereo analog audio. Connect RCA cables from a camera, VTR, audio mixer, or other audio input source.

Input connector descriptions (MXO2 Mini)

This section describes the Matrox MXO2 Mini inputs. For other MXO2 products, see “Input connector descriptions” on page 148.

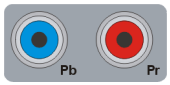
You can select the video and audio inputs to be used as your capture source in the MXO2 Mini preferences window (see “Specifying your A/V input settings (MXO2 Mini)” on page 60). For a list of the supported input and capture formats, see Appendix C, “Matrox MXO2 Supported Input and Capture Formats.”

Note Analog A/V cables connected to Matrox MXO2 Mini must be limited to less than three meters to comply with EEC and EMC directives.

HDMI Provides an input for HD HDMI video (either YUV or RGB), and up to eight channels of uncompressed embedded audio, from a digital HDMI device. HDCP sources and SD video are not supported on this input. Connect a standard HDMI video/audio cable from a camera, VTR, or other video input source.

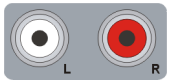
Component video (Y, Pb, Pr) Provide inputs for use with an analog component device, and support HD and SD video. Connect component Y, Pb, Pr video cables from a camera, VTR, or other video input source.

Note When you connect an analog component device to MXO2 Mini, you won’t be able to connect an S-Video or composite device at the same time.



S-Video Input connectors **Pb** and **Pr** allow you to connect the MXO2 S-Video adapter cable for use with an analog S-Video device (SD only). Connect an S-Video cable, via the MXO2 S-Video adapter cable, from a camera, VTR, or other video input source. For an illustration on how to connect S-Video devices to MXO2 Mini, see “Connecting S-Video devices to MXO2 Mini” on page 49.

Composite video (Y) Allows you to input SD video from an analog NTSC or PAL device. Connect a composite video cable from a camera, VTR, or other video input source.

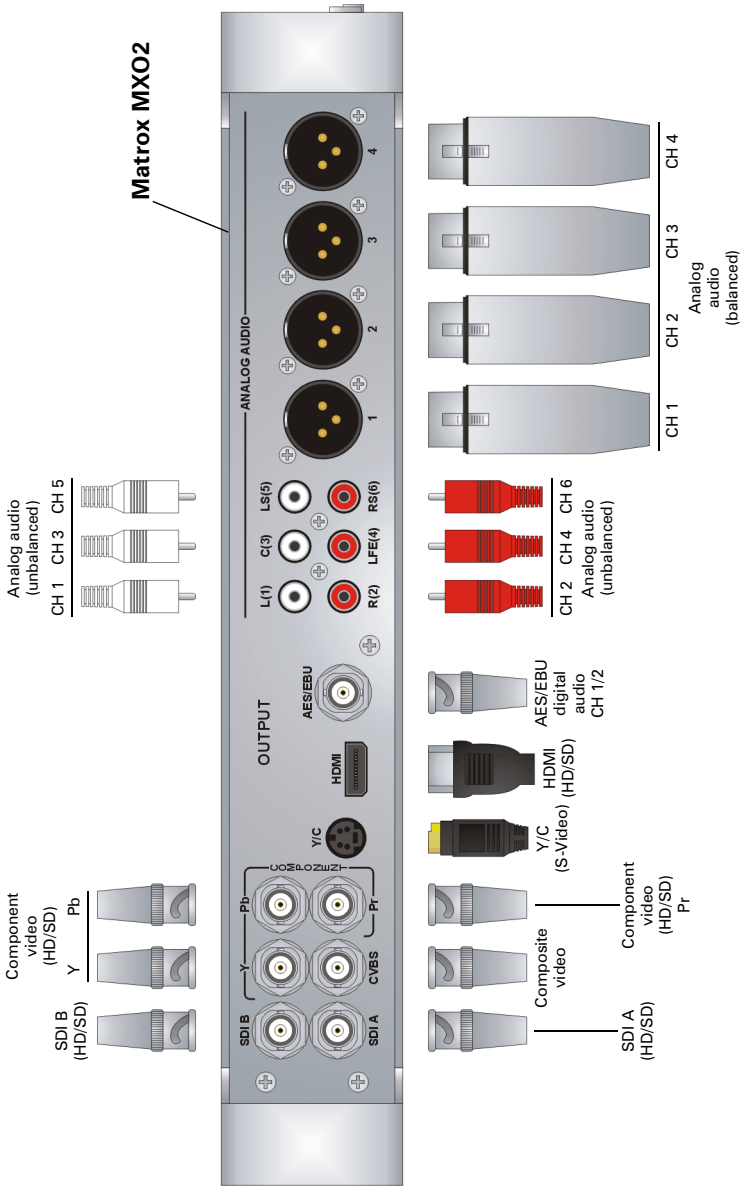


Analog audio (unbalanced) Allows you to input unbalanced stereo analog audio. Connect RCA cables from a camera, VTR, audio mixer, or other audio input source.

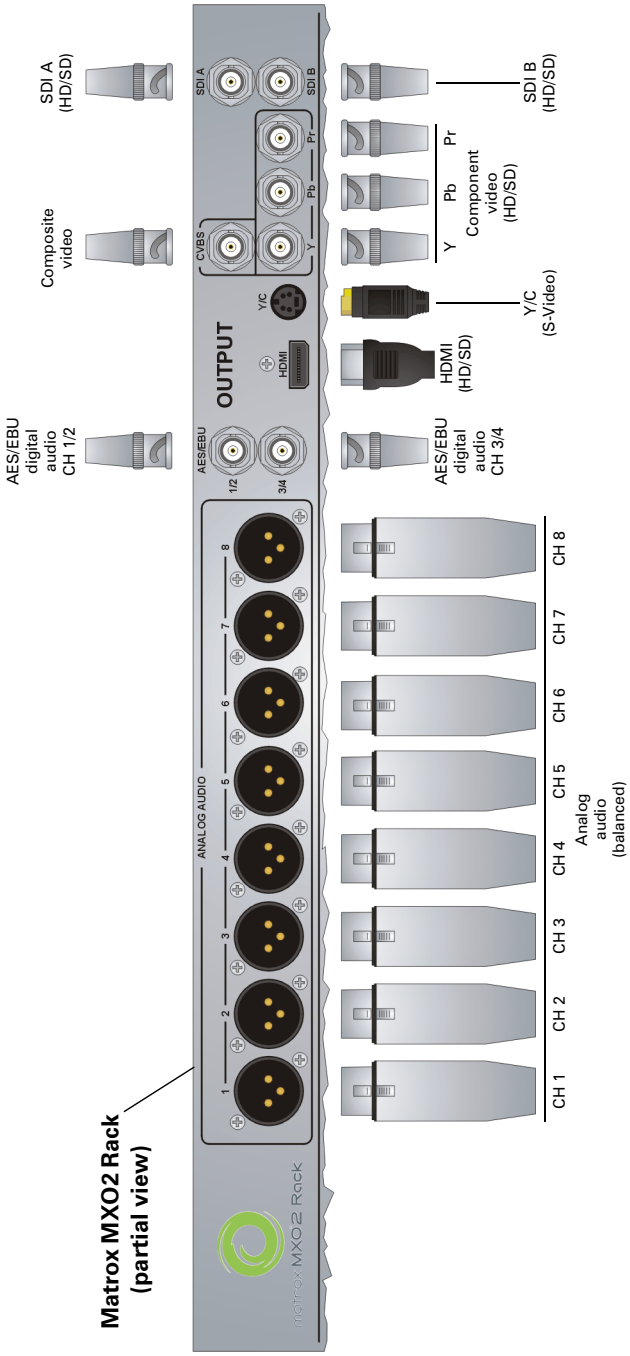
Outputs

The following sections detail the MXO2, MXO2 Rack, MXO2 LE, and MXO2 Mini outputs.

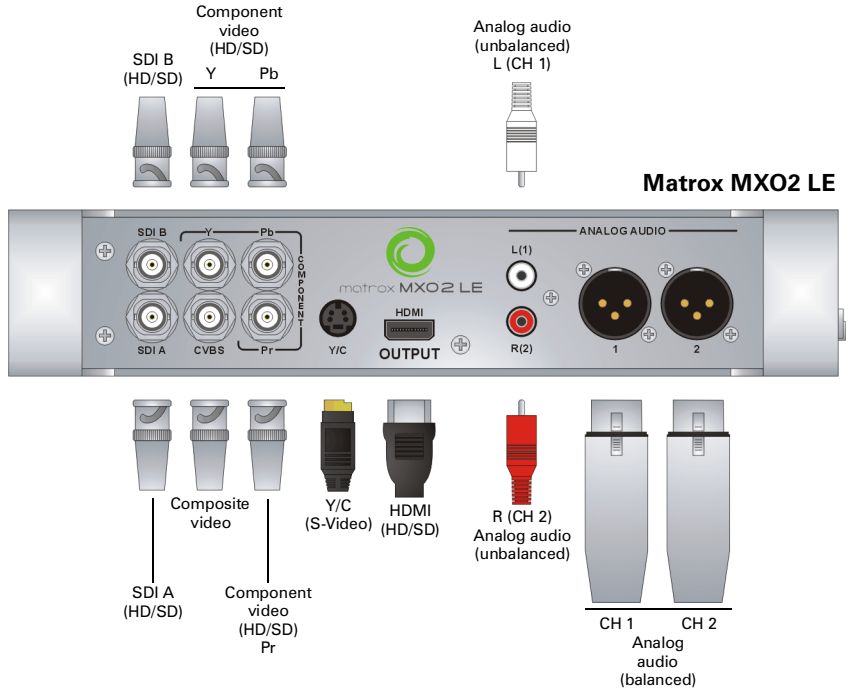
MXO2 outputs



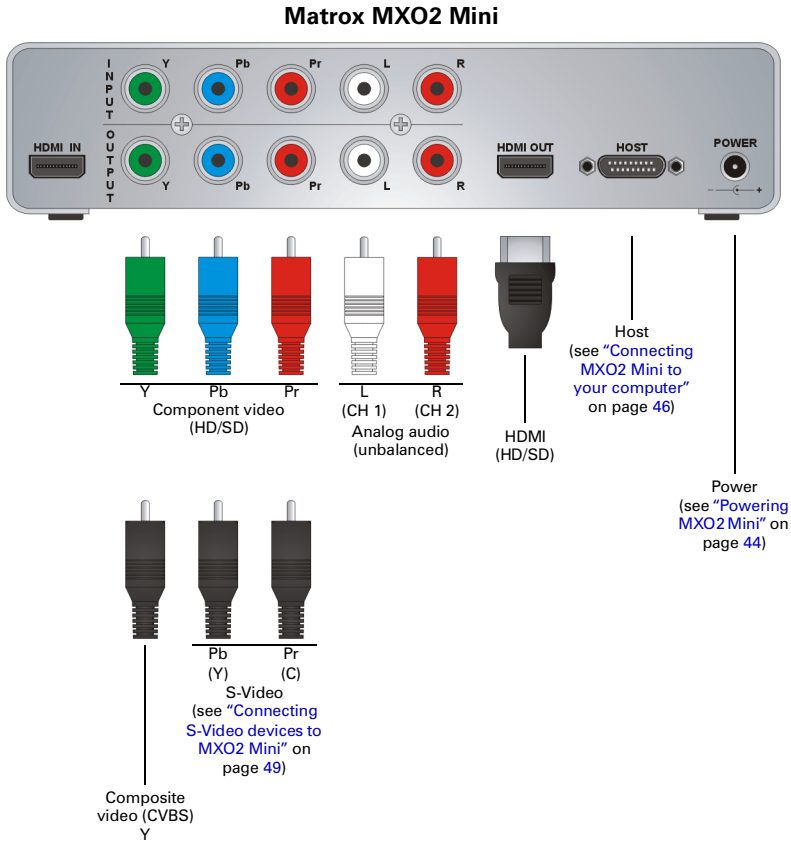
MXO2 Rack outputs



MXO2 LE outputs



MXO2 Mini outputs



Output connector descriptions

This section describes the Matrox MXO2, MXO2 Rack, and MXO2 LE outputs. For MXO2 Mini outputs, see “Output connector descriptions (MXO2 Mini)” on page 157.

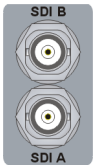
HD to SD downscaling, SD to HD upscaling, and cross conversion are supported on all video outputs simultaneously. To select your video output settings, see “Specifying your video output settings” on page 62. You can also map any audio track in your video application to any MXO2 audio output (see “Specifying your audio output settings” on page 69). For a list of the video formats that you can output from the MXO2 outputs, see “Video formats supported on MXO2 outputs” on page 174.

Note Depending on your MXO2 hardware, some of the following connectors may not be available or may be available in a limited capacity only. Some connectors on your MXO2 hardware may not appear exactly as shown below.

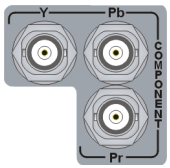
HDMI Provides an output for HD/SD HDMI video, and up to eight channels of embedded audio, to a digital HDMI device. HDCP is not supported on this output. This output supports 1:1 pixel mapping for accurate monitoring on your HDMI display of NTSC, PAL, 1280×720, and 1920×1080 video. Connect a standard HDMI video/audio cable to an HDMI monitor, VTR, or other digital HDMI device. You can also connect directly to a home theatre system for 5.1 surround sound monitoring.

Note The HDMI output supports YUV and RGB devices. To set the HDMI output type, see “Specifying your video output settings” on page 62.

HDMI monitor calibration is available through this output. Use the Matrox HDMI Calibration Utility to calibrate your HDMI monitor (see Chapter 8, “Calibrating Your HDMI Monitor for Video”).



SDI A and SDI B Provide two simultaneous outputs of the same HD-SDI or SD-SDI video, with up to 16 channels of embedded audio. You can also output closed captioning and AFD data using the SDI outputs (see "Matrox 4VANC capture and playback" on page 70). For each output, connect an SDI video/audio cable to a video monitor, VTR, or other SDI device. You can also perform 5.1 surround sound monitoring through the SDI output by connecting to a third-party device, such as an SDI audio de-embedder.



Component video (Y, Pb, Pr) Allows you to output HD or SD video to an analog component device. Connect component Y, Pb, Pr video cables to a video monitor, VTR, or other component device.

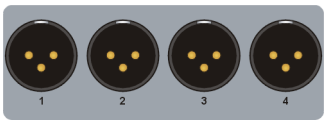
Note The component output supports YUV and RGB devices. To set the component output type, see "Specifying your video output settings" on page 62.

Y/C (S-Video) Provides an output for SD video to an analog S-Video device. Connect an S-Video cable to a video monitor, VTR, or other S-Video device.

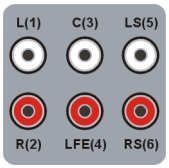
Composite video (CVBS) Allows you to output SD video to an analog NTSC or PAL device. Connect a composite video cable to a video monitor, VTR, or other NTSC or PAL device.

AES/EBU digital audio Allows you to output stereo digital audio. Connect a coaxial BNC audio cable to a VTR, audio mixer, speakers, or other audio device.

Note Not available on MXO2 LE.



Analog audio (balanced) Allows you to output balanced stereo analog audio. Connect XLR cables to a VTR, audio mixer, speakers, or other audio device.



Analog audio (unbalanced) Provide outputs for unbalanced analog audio. Matrox MXO2 offers outputs for channels one to six, or three stereo pairs suitable for 5.1 surround sound monitoring. Connect RCA cables to a VTR, audio mixer, speakers, or other audio device.

Output connector descriptions (MXO2 Mini)

This section describes the Matrox MXO2 Mini outputs. For other MXO2 products, see "Output connector descriptions" on page 155.

HD to SD downscaling, SD to HD upscaling, and cross conversion are supported on all video outputs simultaneously. To select your video output settings, see "Specifying your video output settings (MXO2 Mini)" on page 66. You can also map any audio track in your video application to any MXO2 Mini audio output (see "Specifying your audio output settings" on page 69). For a list of the video formats that you can output from the MXO2 Mini outputs, see "Video formats supported on MXO2 outputs" on page 174.

Note Analog A/V cables connected to Matrox MXO2 Mini must be limited to less than three meters to comply with EEC and EMC directives.

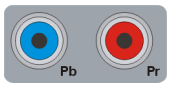
HDMI Provides an output for HD/SD HDMI video, and up to eight channels of embedded audio, to a digital HDMI device. HDCP is not supported on this output. This output supports 1:1 pixel mapping for accurate monitoring on your HDMI display of NTSC, PAL, 1280×720, and 1920×1080 video. Connect a standard HDMI video/audio cable to an HDMI monitor, VTR, or other digital HDMI device. You can also connect directly to a home theatre system for 5.1 surround sound monitoring.

Note The HDMI output supports YUV and RGB devices.

HDMI monitor calibration is available through this output. Use the Matrox HDMI Calibration Utility to calibrate your HDMI monitor (see Chapter 8, "Calibrating Your HDMI Monitor for Video").

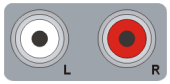
Component video (Y, Pb, Pr) Allows you to output HD or SD video to an analog component device. Connect component Y, Pb, Pr video cables to a video monitor, VTR, or other component device.

Note The component output supports YUV devices only. When you connect an analog component device to MXO2 Mini, you won't be able to connect an S-Video or composite device at the same time.



S-Video Output connectors **Pb** and **Pr** allow you to connect the MXO2 S-Video adapter cable for outputting SD video to an analog S-Video device. Connect an S-Video cable, via the MXO2 S-Video adapter cable, to a video monitor, VTR, or other S-Video device. For instructions on how to connect S-Video devices to MXO2 Mini, see "Connecting S-Video devices to MXO2 Mini" on page 49.

Composite video (Y) Allows you to output SD video to an analog NTSC or PAL device. Connect a composite video cable to a video monitor, VTR, or other NTSC or PAL device.



Analog audio (unbalanced) Provide outputs for unbalanced analog audio channels one and two, or one stereo pair. Connect RCA cables to a VTR, audio mixer, speakers, or other audio device.

C

Matrox MXO2 Supported Input and Capture Formats

This appendix provides information on the video input and capture formats that are supported on all MXO2 products.

Supported input formats

The following table lists the video formats that are supported on the various MXO2, MXO2 Rack, and MXO2 LE inputs. For MXO2 Mini, see "Supported input formats (MXO2 Mini)" on page 161.

For descriptions of the inputs, see "Inputs" on page 144, and for a list of the supported capture formats, see "Supported capture formats" on page 162.

	Matrox MXO2 input				
Source video format	**HDMI**	**SDI**	**Component (Y, Pb, Pr)**	**S-Video (Y/C)**	**Composite (CVBS)**
NTSC	—	✓	✓	✓	✓
PAL	—	✓	✓	✓	✓
720p at 50 fps	✓	✓	✓	—	—
720p at 59.94 fps	✓	✓	✓	—	—
1080i at 50 (25 fps)	✓	✓	✓	—	—
1080i at 59.94 (29.97 fps)	✓	✓	✓	—	—
1080PsF at 23.98 fps	—	✓	✓	—	—
1080p at 23.98 fps	✓	✓	—	—	—
1080p at 24 fps	✓	✓	—	—	—
1080p at 25 fps	✓	✓	—	—	—
1080p at 29.97 fps	✓	✓	—	—	—
1080p at 30 fps	✓	✓	—	—	—

Supported input formats (MXO2 Mini)

The following table lists the video formats that are supported on the various MXO2 Mini inputs. For other MXO2 products, see "Supported input formats" on page 160.

For descriptions of the inputs, see "Inputs" on page 144, and for a list of the supported capture formats, see "Supported capture formats (MXO2 Mini)" on page 163.

	Matrox MXO2 Mini input			
Source video format	**HDMI**	**Component (Y, Pb, Pr)**	**S-Video (Pb, Pr)**	**Composite (Y)**
NTSC	—	✓	✓	✓
PAL	—	✓	✓	✓
720p at 50 fps	✓	✓	—	—
720p at 59.94 fps	✓	✓	—	—
1080i at 50 (25 fps)	✓	✓	—	—
1080i at 59.94 (29.97 fps)	✓	✓	—	—
1080PsF at 23.98 fps	—	✓	—	—
1080p at 23.98 fps	✓	—	—	—
1080p at 24 fps	✓	—	—	—
1080p at 25 fps	✓	—	—	—
1080p at 29.97 fps	✓	—	—	—
1080p at 30 fps	✓	—	—	—

Supported capture formats

The following table lists the capture formats that are supported on MXO2, MXO2 Rack, and MXO2 LE based on the format of your source video. For MXO2 Mini, see "Supported capture formats (MXO2 Mini)" on page 163.

If the format to which you want to capture does not match the format of your source video, you must enable scaling on the input (see "Specifying your A/V input settings" on page 57). For a list of the video formats that are supported on the different Matrox MXO2, MXO2 Rack, and MXO2 LE inputs, see "Supported input formats" on page 160.

	Capture format														
Source video format	**NTSC**	**PAL**	**720p at 23.98 fps**	**720p at 25 fps**	**720p at 50 fps**	**720p at 29.97 fps**	**720p at 59.94 fps**	**1080i at 50 (25 fps)**	**1080i at 59.94 (29.97 fps)**	**1080PsF at 23.98 fps**	**1080p at 23.98 fps**	**1080p at 24 fps**	**1080p at 25 fps**	**1080p at 29.97 fps**	**1080p at 30 fps**
NTSC	✓	—	✓[1]	—	—	✓[1]	✓[1]	—	✓[1]	—	—	—	—	—	—
PAL	—	✓	—	✓[1]	✓[1]	—	—	✓[1]	—	—	—	—	—	—	—
720p at 50 fps	—	✓[1]	—	✓	✓	—	—	✓[1]	—	—	—	—	—	—	—
720p at 59.94 fps	✓[1]	—	✓[2]	—	—	✓	✓	—	✓[1]	—	—	—	—	—	—
1080i at 50 (25 fps)	—	✓[1]	—	✓[1]	✓[1]	—	—	✓	—	—	—	—	—	—	—
1080i at 59.94 (29.97 fps)	✓[1]	—	✓[1]	—	—	✓[1]	✓[1]	—	✓	—	—	—	—	—	—
1080PsF at 23.98 fps	—	—	—	—	—	—	—	—	—	✓	—	—	—	—	—
1080p at 23.98 fps	—	—	—	—	—	—	—	—	—	—	✓	—	—	—	—
1080p at 24 fps	—	—	—	—	—	—	—	—	—	—	—	✓	—	—	—
1080p at 25 fps	—	—	—	—	—	—	—	—	—	—	—	—	✓	—	—
1080p at 29.97 fps	—	—	—	—	—	—	—	—	—	—	—	—	—	✓	—
1080p at 30 fps	—	—	—	—	—	—	—	—	—	—	—	—	—	—	✓

[1] You must enable **Scale input for capture** in the MXO2 preferences window (see "Specifying your A/V input settings" on page 57).

[2] You must specify a frame offset value, or select the **Enable VariCam capture** option if capturing VariCam material, in the MXO2 preferences window (see "Specifying your A/V input settings" on page 57).

Supported capture formats (MXO2 Mini)

The following table lists the capture formats that are supported on MXO2 Mini based on the format of your source video. For other MXO2 products, see "Supported capture formats" on page 162.

If the format to which you want to capture does not match the format of your source video, you must enable scaling on the input (see "Specifying your A/V input settings (MXO2 Mini)" on page 60). For a list of the video formats that are supported on the different Matrox Mini inputs, see "Supported input formats (MXO2 Mini)" on page 161.

	Capture format													
Source video format	**NTSC**	**PAL**	**720p at 25 fps**	**720p at 29.97 fps**	**720p at 50 fps**	**720p at 59.94 fps**	**1080i at 50 (25 fps)**	**1080i at 59.94 (29.97 fps)**	**1080PsF at 23.98 fps**	**1080p at 23.98 fps**	**1080p at 24 fps**	**1080p at 25 fps**	**1080p at 29.97 fps**	**1080p at 30 fps**
NTSC	✓	—	—	✓[1]	—	✓[1]	—	✓[1]	—	—	—	—	—	—
PAL	—	✓	✓[1]	—	✓[1]	—	✓[1]	—	—	—	—	—	—	—
720p at 50 fps	—	✓[1]	✓	—	✓	—	✓[1]	—	—	—	—	—	—	—
720p at 59.94 fps	✓[1]	—	—	✓	—	✓	—	✓[1]	—	—	—	—	—	—
1080i at 50 (25 fps)	—	✓[1]	✓[1]	—	✓[1]	—	✓	—	—	—	—	—	—	—
1080i at 59.94 (29.97 fps)	✓[1]	—	—	✓[1]	—	✓[1]	—	✓	—	—	—	—	—	—
1080PsF at 23.98 fps	—	—	—	—	—	—	—	—	✓	—	—	—	—	—
1080p at 23.98 fps	—	—	—	—	—	—	—	—	—	✓	—	—	—	—
1080p at 24 fps	—	—	—	—	—	—	—	—	—	—	✓	—	—	—
1080p at 25 fps	—	—	—	—	—	—	—	—	—	—	—	✓	—	—
1080p at 29.97 fps	—	—	—	—	—	—	—	—	—	—	—	—	✓	—
1080p at 30 fps	—	—	—	—	—	—	—	—	—	—	—	—	—	✓

[1] You must enable **Scale input for capture** in the MXO2 preferences window (see "Specifying your A/V input settings (MXO2 Mini)" on page 60).

Your notes

D

Matrox MXO2 Supported Output Formats

This appendix provides information on the video output formats that are available on the MXO2 main and SD channels, and the video formats that are supported on the MXO2 outputs.

Supported main and SD video output formats

This section lists the video output formats that are available on the MXO2 main and SD channels based on your project's video format, and the video application used. You can specify the main and SD channel settings on the **Video Output** pane of the MXO2 preferences window (see Chapter 7, "Configuring Your MXO2 System").

Apple Final Cut Pro

MXO2, MXO2 Rack, and MXO2 LE

Project's video format	Main channel output					SD channel output
	Follow application	486p/576p	720p	1080	1080i 29.97 from 23.98	
NTSC	NTSC	486p at 59.94 fps	720p at 59.94 fps	1080i at 29.97 fps	—	NTSC
NTSC 16:9	NTSC 16:9	486p at 59.94 fps	720p at 59.94 fps	1080i at 29.97 fps	—	NTSC
PAL	PAL	576p at 50 fps	720p at 50 fps	1080i at 25 fps	—	PAL
PAL 16:9	PAL 16:9	576p at 50 fps	720p at 50 fps	1080i at 25 fps	—	PAL
486p at 23.98 fps[1]	486p at 59.94 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	1080i at 29.97 fps	NTSC
486p at 23.98 fps 16:9[1]	486p at 59.94 fps 16:9	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	1080i at 29.97 fps	NTSC
486p at 29.97 fps	486p at 59.94 fps	486p at 59.94 fps	720p at 59.94 fps	1080PsF at 29.97 fps	—	NTSC
486p at 29.97 fps 16:9	486p at 59.94 fps 16:9	486p at 59.94 fps	720p at 59.94 fps	1080PsF at 29.97 fps	—	NTSC
576p at 25 fps	576p at 50 fps	576p at 50 fps	720p at 50 fps	1080PsF at 25 fps	—	PAL
576p at 25 fps 16:9	576p at 50 fps 16:9	576p at 50 fps	720p at 50 fps	1080PsF at 25 fps	—	PAL
720p at 23.98 fps[1]	720p at 59.94 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	1080i at 29.97 fps	NTSC
720p at 25 fps	720p at 50 fps	576p at 50 fps	720p at 50 fps	1080PsF at 25 fps	—	PAL
720p at 29.97 fps	720p at 59.94 fps	486p at 59.94 fps	720p at 59.94 fps	1080PsF at 29.97 fps	—	NTSC
720p at 50 fps	720p at 50 fps	576p at 50 fps	720p at 50 fps	1080i at 25 fps	—	PAL
720p at 59.94 fps	720p at 59.94 fps	486p at 59.94 fps	720p at 59.94 fps	1080i at 29.97 fps	—	NTSC
1080i at 50 (25 fps)	1080i at 25 fps	576p at 50 fps	720p at 50 fps	1080i at 25 fps	—	PAL
1080i at 59.94 (29.97 fps)	1080i at 29.97 fps	486p at 59.94 fps	720p at 59.94 fps	1080i at 29.97 fps	—	NTSC

Project's video format	Main channel output					SD channel output
	Follow application	486p/576p	720p	1080	1080i 29.97 from 23.98	
1080PsF at 23.98 fps[1]	1080PsF at 23.98 fps	486p at 59.94 fps	720p at 59.94 fps	1080PsF at 23.98 fps	1080i at 29.97 fps	NTSC
1080PsF at 25 fps	1080PsF at 25 fps	576p at 50 fps	720p at 50 fps	1080PsF at 25 fps	—	PAL
1080PsF at 29.97 fps	1080PsF at 29.97 fps	486p at 59.94 fps	720p at 59.94 fps	1080PsF at 29.97 fps	—	NTSC
1080p at 23.98 fps[1]	1080p at 23.98 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	1080i at 29.97 fps	NTSC
1080p at 24 fps	1080p at 24 fps	—	—	1080p at 24 fps	—	—
1080p at 25 fps	1080p at 25 fps	576p at 50 fps	720p at 50 fps	1080p at 25 fps	—	PAL
1080p at 29.97 fps	1080p at 29.97 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 29.97 fps	—	NTSC
1080p at 30 fps	1080p at 30 fps	—	—	1080p at 30 fps	—	—
RED 1K 2:1 at 23.98 fps[1, 2] (1024×512)	1080PsF at 23.98 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	1080i at 29.97 fps	NTSC
RED 1K 16:9 at 23.98 fps[1, 2] (1024×576)	1080PsF at 23.98 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	1080i at 29.97 fps	NTSC
RED 2K 2:1 at 23.98 fps[1, 2] (2048×1024)	1080PsF at 23.98 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	1080i at 29.97 fps	NTSC
RED 2K 16:9 at 23.98 fps[1, 2] (2048×1152)	1080PsF at 23.98 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	1080i at 29.97 fps	NTSC
RED 1K 2:1 at 25 fps[2] (1024×512)	1080PsF at 25 fps	576p at 50 fps	720p at 50 fps	1080p at 25 fps	—	PAL
RED 1K 16:9 at 25 fps[2] (1024×576)	1080PsF at 25 fps	576p at 50 fps	720p at 50 fps	1080p at 25 fps	—	PAL
RED 2K 2:1 at 25 fps[2] (2048×1024)	1080PsF at 25 fps	576p at 50 fps	720p at 50 fps	1080p at 25 fps	—	PAL
RED 2K 16:9 at 25 fps[2] (2048×1152)	1080PsF at 25 fps	576p at 50 fps	720p at 50 fps	1080p at 25 fps	—	PAL

[1] A pulldown is applied for 23.98 fps video when outputting 29.97 fps or 59.94 fps. To set the pulldown method, see "Specifying your video output settings" on page 62.

[2] RED 1K and RED 2K projects are output at 8-bits only.

MXO2 Mini

Project's video format	Main channel output				SD channel output
	Follow application	486p/576p	720p	1080	
NTSC	NTSC	486p at 59.94 fps	720p at 59.94 fps	1080i at 29.97 fps	NTSC
NTSC 16:9	NTSC 16:9	486p at 59.94 fps	720p at 59.94 fps	1080i at 29.97 fps	NTSC
PAL	PAL	576p at 50 fps	720p at 50 fps	1080i at 25 fps	PAL
PAL 16:9	PAL 16:9	576p at 50 fps	720p at 50 fps	1080i at 25 fps	PAL
486p at 23.98 fps[1]	486p at 59.94 fps	486p at 59.94 fps	720p at 59.94 fps	1080i at 29.97 fps	NTSC
486p at 23.98 fps 16:9[1]	486p at 59.94 fps 16:9	486p at 59.94 fps	720p at 59.94 fps	1080i at 29.97 fps	NTSC
486p at 29.97 fps	486p at 59.94 fps	486p at 59.94 fps	720p at 59.94 fps	1080PsF at 29.97 fps	NTSC
486p at 29.97 fps 16:9	486p at 59.94 fps 16:9	486p at 59.94 fps	720p at 59.94 fps	1080PsF at 29.97 fps	NTSC
576p at 25 fps	576p at 50 fps	576p at 50 fps	720p at 50 fps	1080PsF at 25 fps	PAL
576p at 25 fps 16:9	576p at 50 fps 16:9	576p at 50 fps	720p at 50 fps	1080PsF at 25 fps	PAL
720p at 23.98 fps[1]	720p at 59.94 fps	486p at 59.94 fps	720p at 59.94 fps	1080i at 29.97 fps	NTSC
720p at 25 fps	720p at 50 fps	576p at 50 fps	720p at 50 fps	1080PsF at 25 fps	PAL
720p at 29.97 fps	720p at 59.94 fps	486p at 59.94 fps	720p at 59.94 fps	1080PsF at 29.97 fps	NTSC
720p at 50 fps	720p at 50 fps	576p at 50 fps	720p at 50 fps	1080i at 25 fps	PAL
720p at 59.94 fps	720p at 59.94 fps	486p at 59.94 fps	720p at 59.94 fps	1080i at 29.97 fps	NTSC
1080i at 50 (25 fps)	1080i at 25 fps	576p at 50 fps	720p at 50 fps	1080i at 25 fps	PAL
1080i at 59.94 (29.97 fps)	1080i at 29.97 fps	486p at 59.94 fps	720p at 59.94 fps	1080i at 29.97 fps	NTSC
1080PsF at 23.98 fps[1]	1080PsF at 23.98 fps	486p at 59.94 fps	720p at 59.94 fps	1080i at 29.97 fps	NTSC
1080PsF at 25 fps	1080PsF at 25 fps	576p at 50 fps	720p at 50 fps	1080PsF at 25 fps	PAL
1080PsF at 29.97 fps	1080PsF at 29.97 fps	486p at 59.94 fps	720p at 59.94 fps	1080PsF at 29.97 fps	NTSC
1080p at 23.98 fps[1]	1080p at 23.98 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	NTSC
1080p at 24 fps	1080p at 24 fps	—	—	1080p at 24 fps	—
1080p at 25 fps	1080p at 25 fps	576p at 50 fps	720p at 50 fps	1080p at 25 fps	PAL
1080p at 29.97 fps	1080p at 29.97 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 29.97 fps	NTSC
1080p at 30 fps	1080p at 30 fps	—	—	1080p at 30 fps	—

[1] A pulldown is applied for 23.98 fps video when outputting 29.97 fps or 59.94 fps. To set the pulldown method, see "Specifying your video output settings (MXO2 Mini)" on page 66.

Matrox Vetura Playback, Adobe Premiere Pro and Encore

Note When using Matrox Vetura Playback with video resolutions smaller than SD, your project will be upscaled to either NTSC or PAL, depending on the frame rate.

MXO2, MXO2 Rack, and MXO2 LE

Project's video format	Main channel output					SD channel output
	Follow application	486p/576p	720p	1080	1080i 29.97 from 23.98	
NTSC (720×486i)	NTSC	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	—	NTSC
NTSC 16:9 (720×486i)	NTSC 16:9	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	—	NTSC
PAL (720×576i)	PAL	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	—	PAL
PAL 16:9 (720×576i)	PAL 16:9	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	—	PAL
DV-NTSC[1] (720×486i)	NTSC	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	—	NTSC
DV-NTSC 16:9[1] (720×486i)	NTSC 16:9	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	—	NTSC
DV-PAL[1] (720×576i)	PAL	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	—	PAL
DV-PAL 16:9[1] (720×576i)	PAL 16:9	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	—	PAL
486p at 23.98 fps[1,2]	720×486p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080p at 23.98 fps	1920×1080i at 29.97 fps	NTSC
486p at 23.98 fps 16:9[1,2]	720×486p at 59.94 fps 16:9	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080p at 23.98 fps	1920×1080i at 29.97 fps	NTSC
486p at 29.97 fps[1]	720×486p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 29.97 fps	—	NTSC
486p at 29.97 fps 16:9[1]	720×486p at 59.94 fps 16:9	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 29.97 fps	—	NTSC
576p at 25 fps[1]	720×576p at 50 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080PsF at 25 fps	—	PAL
576p at 25 fps 16:9[1]	720×576p at 50 fps 16:9	720×576p at 50 fps	1280×720p at 50 fps	1920×1080PsF at 25 fps	—	PAL
960×720p at 23.98 fps[2]	1280×720p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080p at 23.98 fps	1920×1080i at 29.97 fps	NTSC
960×720p at 25 fps	1280×720p at 50 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080PsF at 25 fps	—	PAL

Project's video format	Main channel output					SD channel output
	Follow application	486p/576p	720p	1080	1080i 29.97 from 23.98	
960×720p at 29.97 fps	1280×720p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 29.97 fps	—	NTSC
960×720p at 50 fps	1280×720p at 50 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	—	PAL
960×720p at 59.94 fps	1280×720p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	—	NTSC
1280×720p at 23.98 fps[2]	1280×720p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080p at 23.98 fps	1920×1080i at 29.97 fps	NTSC
1280×720p at 25 fps	1280×720p at 50 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080PsF at 25 fps	—	PAL
1280×720p at 29.97 fps	1280×720p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 29.97 fps	—	NTSC
1280×720p at 50 fps	1280×720p at 50 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	—	PAL
1280×720p at 59.94 fps	1280×720p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	—	NTSC
1280×1080i at 29.97 fps	1920×1080i at 29.97 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	—	NTSC
1440×1080i at 25 fps	1920×1080i at 25 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	—	PAL
1440×1080i at 29.97 fps	1920×1080i at 29.97 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	—	NTSC
1920×1080i at 25 fps	1920×1080i at 25 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	—	PAL
1920×1080i at 29.97 fps	1920×1080i at 29.97 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	—	NTSC
1280×1080p at 23.98 fps[2]	1920×1080PsF at 23.98 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 23.98 fps	1920×1080i at 29.97 fps	NTSC
1440×1080p at 23.98 fps[2]	1920×1080PsF at 23.98 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 23.98 fps	1920×1080i at 29.97 fps	NTSC
1440×1080p at 24 fps	1920×1080p at 24 fps	—	—	1920×1080p at 24 fps	—	—
1440×1080p at 25 fps	1920×1080PsF at 25 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080PsF at 25 fps	—	PAL
1440×1080p at 29.97 fps	1920×1080PsF at 29.97 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 29.97 fps	—	NTSC
1440×1080p at 30 fps	1920×1080p at 30 fps	—	—	1920×1080p at 30 fps	—	—
1920×1080p at 23.98 fps[2]	1920×1080PsF at 23.98 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 23.98 fps	1920×1080i at 29.97 fps	NTSC

Project's video format	Main channel output					SD channel output
	Follow application	486p/576p	720p	1080	1080i 29.97 from 23.98	
1920×1080p at 24 fps	1920×1080p at 24 fps	—	—	1920×1080p at 24 fps	—	—
1920×1080p at 25 fps	1920×1080PsF at 25 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080PsF at 25 fps	—	PAL
1920×1080p at 29.97 fps	1920×1080PsF at 29.97 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 29.97 fps	—	NTSC
1920×1080p at 30 fps	1920×1080p at 30 fps	—	—	1920×1080p at 30 fps	—	—
RED 1K 2:1 at 23.98 fps[2, 3, 4] (1024×512)	1080PsF at 23.98 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	1080i at 29.97 fps	NTSC
RED 1K 16:9 at 23.98 fps[2, 3, 4] (1024×576)	1080PsF at 23.98 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	1080i at 29.97 fps	NTSC
RED 2K 2:1 at 23.98 fps[2, 3, 4] (2048×1024)	1080PsF at 23.98 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	1080i at 29.97 fps	NTSC
RED 2K 16:9 at 23.98 fps[2, 3, 4] (2048×1152)	1080PsF at 23.98 fps	486p at 59.94 fps	720p at 59.94 fps	1080p at 23.98 fps	1080i at 29.97 fps	NTSC
RED 1K 2:1 at 25 fps[3, 4] (1024×512)	1080PsF at 25 fps	576p at 50 fps	720p at 50 fps	1080p at 25 fps	—	PAL
RED 1K 16:9 at 25 fps[3, 4] (1024×576)	1080PsF at 25 fps	576p at 50 fps	720p at 50 fps	1080p at 25 fps	—	PAL
RED 2K 2:1 at 25 fps[3, 4] (2048×1024)	1080PsF at 25 fps	576p at 50 fps	720p at 50 fps	1080p at 25 fps	—	PAL
RED 2K 16:9 at 25 fps[3, 4] (2048×1152)	1080PsF at 25 fps	576p at 50 fps	720p at 50 fps	1080p at 25 fps	—	PAL

[1] Not available in Adobe Encore.

[2] A pulldown is applied for 23.98 fps video when outputting 29.97 fps or 59.94 fps. To set the pulldown method, see "Specifying your video output settings" on page 62.

[3] RED 1K and RED 2K projects are output at 8-bits only.

[4] Available in Adobe Premiere Pro only.

MXO2 Mini

Project's video format	Main channel output				SD channel output
	Follow application	486p/576p	720p	1080	
NTSC (486×720i)	NTSC	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
NTSC 16:9 (486×720i)	NTSC 16:9	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
PAL (576×720i)	PAL	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	PAL
PAL 16:9 (576×720i)	PAL 16:9	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	PAL
DV-NTSC[1] (480×720i)	NTSC	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
DV-NTSC 16:9[1] (480×720i)	NTSC 16:9	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
DV-PAL[1] (576×720i)	PAL	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	PAL
DV-PAL 16:9[1] (576×720i)	PAL 16:9	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	PAL
486p at 23.98 fps[1,2]	720×486p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
486p at 23.98 fps 16:9[1,2]	720×486p at 59.94 fps 16:9	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
486p at 29.97 fps[1]	720×486p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 29.97 fps	NTSC
486p at 29.97 fps 16:9[1]	720×486p at 59.94 fps 16:9	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 29.97 fps	NTSC
576p at 25 fps[1]	720×576p at 50 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080PsF at 25 fps	PAL
576p at 25 fps 16:9[1]	720×576p at 50 fps 16:9	720×576p at 50 fps	1280×720p at 50 fps	1920×1080PsF at 25 fps	PAL
960×720p at 23.98 fps[2]	1280×720p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
960×720p at 25 fps	1280×720p at 50 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080PsF at 25 fps	PAL
960×720p at 29.97 fps	1280×720p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 29.97 fps	NTSC
960×720p at 50 fps	1280×720p at 50 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	PAL
960×720p at 59.94 fps	1280×720p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
1280×720p at 23.98 fps[2]	1280×720p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
1280×720p at 25 fps	1280×720p at 50 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080PsF at 25 fps	PAL

Project's video format	Main channel output				SD channel output
	Follow application	486p/576p	720p	1080	
1280×720p at 29.97 fps	1280×720p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 29.97 fps	NTSC
1280×720p at 50 fps	1280×720p at 50 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	PAL
1280×720p at 59.94 fps	1280×720p at 59.94 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
1280×1080i at 29.97 fps	1920×1080i at 29.97 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
1440×1080i at 25 fps	1920×1080i at 25 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	PAL
1440×1080i at 29.97 fps	1920×1080i at 29.97 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
1920×1080i at 25 fps	1920×1080i at 25 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080i at 25 fps	PAL
1920×1080i at 29.97 fps	1920×1080i at 29.97 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
1280×1080p at 23.98 fps[2]	1920×1080PsF at 23.98 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
1440×1080p at 23.98 fps[2]	1920×1080PsF at 23.98 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
1440×1080p at 24 fps	1920×1080p at 24 fps	—	—	1920×1080p at 24 fps	—
1440×1080p at 25 fps	1920×1080PsF at 25 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080PsF at 25 fps	PAL
1440×1080p at 29.97 fps	1920×1080PsF at 29.97 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 29.97 fps	NTSC
1440×1080p at 30 fps	1920×1080p at 30 fps	—	—	1920×1080p at 30 fps	—
1920×1080p at 23.98 fps[2]	1920×1080PsF at 23.98 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080i at 29.97 fps	NTSC
1920×1080p at 24 fps	1920×1080p at 24 fps	—	—	1920×1080p at 24 fps	—
1920×1080p at 25 fps	1920×1080PsF at 25 fps	720×576p at 50 fps	1280×720p at 50 fps	1920×1080PsF at 25 fps	PAL
1920×1080p at 29.97 fps	1920×1080PsF at 29.97 fps	720×486p at 59.94 fps	1280×720p at 59.94 fps	1920×1080PsF at 29.97 fps	NTSC
1920×1080p at 30 fps	1920×1080p at 30 fps	—	—	1920×1080p at 30 fps	—

[1] Not available in Adobe Encore.

[2] A pulldown is applied for 23.98 fps video when outputting 29.97 fps or 59.94 fps. To set the pulldown method, see "Specifying your video output settings (MXO2 Mini)" on page 66.

Video formats supported on MXO2 outputs

The following table lists the video formats that you can output from the various Matrox MXO2 outputs. The listed video output formats are those that are supported on the main and SD channels (see "Supported main and SD video output formats" on page 166). To assign the main or SD channel to an MXO2 output, see "Specifying your video output settings" on page 62, or "Specifying your video output settings (MXO2 Mini)" on page 66. For descriptions of the MXO2 outputs, see "Outputs" on page 151.

MXO2, MXO2 Rack, and MXO2 LE

	Matrox MXO2 output				
Video output format	**HDMI**	**SDI**	**Component (Y, Pb, Pr)**	**S-Video (Y/C)**	**Composite (CVBS)**
NTSC	480i at 29.97 fps	NTSC	NTSC	NTSC	NTSC
NTSC 16:9	480i at 29.97 fps 16:9	NTSC 16:9	NTSC 16:9	NTSC 16:9	NTSC 16:9
PAL	PAL	PAL	PAL	PAL	PAL
PAL 16:9	PAL 16:9	PAL 16:9	PAL 16:9	PAL 16:9	PAL 16:9
486p at 59.94 fps	480p at 59.94 fps	NTSC	—	—	—
486p at 59.94 fps 16:9	480p at 59.94 fps 16:9	NTSC 16:9	—	—	—
576p at 50 fps	576p at 50 fps	PAL	—	—	—
576p at 50 fps 16:9	576p at 50 fps 16:9	PAL 16:9	—	—	—
720p at 50 fps	720p at 50 fps	720p at 50 fps	720p at 50 fps	—	—
720p at 59.94 fps	720p at 59.94 fps	720p at 59.94 fps	720p at 59.94 fps	—	—
1080i at 25 fps	1080i at 25 fps	1080i at 25 fps	1080i at 25 fps	—	—
1080i at 29.97 fps	1080i at 29.97 fps	1080i at 29.97 fps	1080i at 29.97 fps	—	—
1080PsF at 23.98 fps	—	1080PsF at 23.98 fps	1080PsF at 23.98 fps	—	—
1080PsF at 25 fps	1080PsF at 25 fps	1080PsF at 25 fps	1080PsF at 25 fps	—	—
1080PsF at 29.97 fps	1080PsF at 29.97 fps	1080PsF at 29.97 fps	1080PsF at 29.97 fps	—	—
1080p at 23.98 fps	1080p at 23.98 fps	1080p at 23.98 fps	—	—	—
1080p at 24 fps	1080p at 24 fps	1080p at 24 fps	—	—	—
1080p at 25 fps	1080p at 25 fps	1080p at 25 fps	—	—	—
1080p at 29.97 fps	1080p at 29.97 fps	1080p at 29.97 fps	—	—	—
1080p at 30 fps	1080p at 30 fps	1080p at 30 fps	—	—	—

MXO2 Mini

	Matrox MXO2 Mini output			
Video output format	**HDMI**	**Component (Y, Pb, Pr)**	**S-Video (Pb, Pr)**	**Composite (Y)**
NTSC	480i at 29.97 fps	NTSC	NTSC	NTSC
NTSC 16:9	480i at 29.97 fps 16:9	NTSC 16:9	NTSC 16:9	NTSC 16:9
PAL	PAL	PAL	PAL	PAL
PAL 16:9	PAL 16:9	PAL 16:9	PAL 16:9	PAL 16:9
486p at 59.94 fps	480p at 59.94 fps	—	—	—
486p at 59.94 fps 16:9	480p at 59.94 fps 16:9	—	—	—
576p at 50 fps	576p at 50 fps	—	—	—
576p at 50 fps 16:9	576p at 50 fps 16:9	—	—	—
720p at 50 fps	720p at 50 fps	720p at 50 fps	—	—
720p at 59.94 fps	720p at 59.94 fps	720p at 59.94 fps	—	—
1080i at 25 fps	1080i at 25 fps	1080i at 25 fps	—	—
1080i at 29.97 fps	1080i at 29.97 fps	1080i at 29.97 fps	—	—
1080PsF at 23.98 fps	—	1080PsF at 23.98 fps	—	—
1080PsF at 25 fps	1080PsF at 25 fps	1080PsF at 25 fps	—	—
1080PsF at 29.97 fps	1080PsF at 29.97 fps	1080PsF at 29.97 fps	—	—
1080p at 23.98 fps	1080p at 23.98 fps	—	—	—
1080p at 24 fps	1080p at 24 fps	—	—	—
1080p at 25 fps	1080p at 25 fps	—	—	—
1080p at 29.97 fps	1080p at 29.97 fps	—	—	—
1080p at 30 fps	1080p at 30 fps	—	—	—

Your notes

E

Matrox MXO2 Specifications

This appendix provides specifications for all Matrox MXO2 products, and Matrox PCIe host adapters.

Matrox MXO2 specifications

General

- **Video formats** NTSC, PAL, NTSC-EIAJ, 1080p/i/PsF, 720p, 576p, 480p
- **Regulatory compliance**
  - FCC Class A, CE Mark Class A, ACMA C-Tick Mark, VCCI
  - RoHS Directive 2002/95/EC
- **Dimensions**
  - Length 330 mm (13")
  - Width 241 mm (9.5")
  - Height 51 mm (2")
- **External AC/DC adapter**
  - 100-240 VAC 50-60 Hz
  - Input: IEC320-C14 inlet
  - Output: +12V DC, 3A max
  - Dimensions: L 104 mm × W 46 mm × H 36 mm (4.1" × 1.8" × 1.4")
- **Total power consumption** 15 watts

Connections

- **Genlock reference input**
  - HD analog tri-level sync or SD analog bi-level black burst
  - BNC connector (75 Ω), terminated
- **RS-422** D-sub connector (9 pins)

Video

- **HDMI**
  - **HD input and output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (10-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
  - **SD output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (10-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
- **SDI**
  - **HDTV input**
    - HD-SDI with 16 channels of embedded SDI audio

- 24-bit, 48 kHz
- Compliant with SMPTE 292M, SMPTE 299M
- BNC connector (75 Ω), terminated
- Equalized input for maximum cable length support

– **HDTV output**

- HD-SDI with 16 channels of embedded SDI audio
- 24-bit, 48 kHz
- Compliant with SMPTE 292M, SMPTE 299M
- BNC connector (75 Ω)

– **SDTV input**

- SD-SDI with 16 channels of embedded audio
- 24-bit, 48 kHz
- BNC connector (75 Ω), terminated
- Equalized input for maximum cable length support
- Compliant with SMPTE 259M-C, SMPTE 272M

– **SDTV output**

- SD-SDI with 16 channels of embedded audio
- 24-bit, 48 kHz
- BNC connector (75 Ω)
- Compliant with SMPTE 259M-C, SMPTE 272M

• **S-Video and composite video input**

– **SDTV input**

- PAL, NTSC, NTSC-EIAJ
- BNC connector for composite (75 Ω), terminated
- 4-pin mini-DIN S-Video connector (75 Ω), terminated
- 12-bit ADC
- 2x oversampling
- Anti-aliasing filtering
- Automatic gain control

– **SDTV output**

- PAL, NTSC, NTSC-EIAJ
- BNC connector for composite (75 Ω)
- 4-pin mini-DIN S-Video connector (75 Ω)
- 12-bit DAC
- 8x oversampling

- **Analog component video input**
  - **HDTV input**
    - EIA-770.3 compliant
    - BNC connectors (75 Ω)
    - 12-bit ADC
    - Anti-aliasing filtering
  - **HDTV output**
    - EIA-770.3 compliant
    - BNC connectors (75 Ω)
    - 12-bit DAC
    - 2x oversampling
  - **SDTV input**
    - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
    - SMPTE/EBU N10 (PAL)
    - BNC connectors (75 Ω)
    - 12-bit ADC
    - 4x oversampling
    - Anti-aliasing filter
  - **SDTV output**
    - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
    - SMPTE/EBU N10 (PAL)
    - BNC connectors (75 Ω)
    - 12-bit DAC
    - 8x oversampling
- **Analog video performance**
  - **HDTV analog component video (passthrough)**
    - Frequency response Y: +/- 1.0 dB max to 28 MHz
    - Frequency response Pb, Pr: +/- 1.0 dB max to 12 MHz
    - Component channel delay: < 8 ns
    - Component S/N (Y, Pb, Pr): > 50 dB, unified weighted
  - **SDTV S-Video and composite video (passthrough)**
    - Amplitude error: < 4%
    - Frequency response: +/- 0.5 dB max to 5 MHz
    - 2T pulse response: 1.0% max
    - Diff. Gain: < 2%, Diff. Phase: < 1 degree

  - S/N: > 58 dB, unified weighted
- **SDTV analog component video (passthrough)**
  - Frequency response Y: +/- 0.5 dB max to 5 MHz
  - Frequency response Pb, Pr: +/- 1.0 dB max to 2 MHz
  - Component channel delay: < 8 ns
  - Component S/N (Y, Pb, Pr): > 54 dB, unified weighted

Audio

- **Unbalanced analog audio inputs**
  - 1x stereo pair
  - RCA connectors
  - Input impedance: Hi-Z
  - Line level with 18 db headroom (max level)
- **Unbalanced analog audio outputs**
  - 3x stereo pair
  - RCA connectors
  - Output impedance: 100 Ω
  - Line level with 18 db headroom (max level)
- **Balanced analog inputs**
  - 1x stereo pair
  - 2x XLR female connectors
  - Nominal levels: +4 dBu (+4 dBm)
  - Input impedance: Hi-Z
  - Headroom (max level): 18 db
- **Balanced analog outputs**
  - 2x stereo pair
  - 4x XLR male connectors
  - Nominal levels: +4 dBu (+4 dBm)
  - Output impedance: 50 Ω
  - Headroom (max level): 18 db
- **Unbalanced digital (AES/EBU) input**
  - 1x stereo pair
  - BNC connector (75 Ω), terminated
  - Maximum input level: 5 V_{p-p}
- **Unbalanced digital (AES/EBU) output**
  - 1x stereo pair

  - BNC connector
  - Output impedance: 75 Ω
  - Nominal output level: $1V_{p-p}$
- **Balanced and unbalanced analog audio performance**
  - Sampling frequency: 48 kHz (using 64x oversampling)
  - Quantization: 24 bits
  - S/N: > 85 db
  - THDN at 1 kHz, nominal level: < 0.05%

Environmental specifications

- Minimum/maximum ambient operating temperatures: 0 to 40º C
- Minimum/maximum storage temperature: –40 to 75º C
- Maximum altitude for operation: 3,000 meters
- Maximum altitude for transport: 12,000 meters
- Operating humidity: 20 to 80% relative humidity (non-condensing)
- Storage humidity: 5 to 95% relative humidity (non-condensing)

Matrox MXO2 Rack specifications

General

- **Video formats** NTSC, PAL, NTSC-EIAJ, 1080p/i/PsF, 720p, 576p, 480p
- **Regulatory compliance**
  - FCC Class A, CE Mark Class A, ACMA C-Tick Mark, VCCI
  - RoHS Directive 2002/95/EC
- **Dimensions (without rackmount brackets)**
  - Length 437 mm (17.2")
  - Width 208 mm (8.2")
  - Height 86 mm (3.4") (two rack units)
- **Dimensions (with rackmount brackets)**
  - Length 483 mm (19")
  - Width 208 mm (8.2")
  - Height 89 mm (3.5") (two rack units)
- **AC power**
  - 100-240 VAC 50-60 Hz
  - Input: IEC320-C14 inlet
  - Output: +12V DC, 3A max

- **Total power consumption** 15 watts

Connections

- **Genlock reference input**
  - HD analog tri-level sync or SD analog bi-level black burst
  - BNC connector (75 Ω)
- **Genlock reference output**
  - HD analog tri-level sync or SD analog bi-level black burst
  - Loop through
  - BNC connector (75 Ω)
- **RS-422** D-sub connector (9 pins)

Video

- **HDMI**
  - **HD input and output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (10-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
  - **SD output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (10-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
- **SDI**
  - **HDTV input**
    - HD-SDI with 16 channels of embedded SDI audio
    - 24-bit, 48 kHz
    - Compliant with SMPTE 292M, SMPTE 299M
    - BNC connector (75 Ω), terminated
    - Equalized input for maximum cable length support
  - **HDTV output**
    - HD-SDI with 16 channels of embedded SDI audio
    - 24-bit, 48 kHz
    - Compliant with SMPTE 292M, SMPTE 299M
    - BNC connector (75 Ω)

  - **SDTV input**
    - SD-SDI with 16 channels of embedded audio
    - 24-bit, 48 kHz
    - BNC connector (75 Ω), terminated
    - Equalized input for maximum cable length support
    - Compliant with SMPTE 259M-C, SMPTE 272M
  - **SDTV output**
    - SD-SDI with 16 channels of embedded audio
    - 24-bit, 48 kHz
    - BNC connector (75 Ω)
    - Compliant with SMPTE 259M-C, SMPTE 272M
- **S-Video and composite video input**
  - **SDTV input**
    - PAL, NTSC, NTSC-EIAJ
    - BNC connector for composite (75 Ω), terminated
    - 4-pin mini-DIN S-Video connector (75 Ω), terminated
    - 12-bit ADC
    - 2x oversampling
    - Anti-aliasing filtering
    - Automatic gain control
  - **SDTV output**
    - PAL, NTSC, NTSC-EIAJ
    - BNC connector for composite (75 Ω)
    - 4-pin mini-DIN S-Video connector (75 Ω)
    - 12-bit DAC
    - 8x oversampling
- **Analog component video input**
  - **HDTV input**
    - EIA-770.3 compliant
    - BNC connectors (75 Ω)
    - 12-bit ADC
    - Anti-aliasing filtering
  - **HDTV output**
    - EIA-770.3 compliant
    - BNC connectors (75 Ω)

- 12-bit DAC
- 2x oversampling

– **SDTV input**

- Betacam, Betacam SP (NTSC and NTSC-EIAJ)
- SMPTE/EBU N10 (PAL)
- BNC connectors (75 Ω)
- 12-bit ADC
- 4x oversampling
- Anti-aliasing filter

– **SDTV output**

- Betacam, Betacam SP (NTSC and NTSC-EIAJ)
- SMPTE/EBU N10 (PAL)
- BNC connectors (75 Ω)
- 12-bit DAC
- 8x oversampling

• **Analog video performance**

– **HDTV analog component video (passthrough)**

- Frequency response Y: +/- 1.0 dB max to 28 MHz
- Frequency response Pb, Pr: +/- 1.0 dB max to 12 MHz
- Component channel delay: < 8 ns
- Component S/N (Y, Pb, Pr): > 50 dB, unified weighted

– **SDTV S-Video and composite video (passthrough)**

- Amplitude error: < 4%
- Frequency response: +/- 0.5 dB max to 5 MHz
- 2T pulse response: 1.0% max
- Diff. Gain: < 2%, Diff. Phase: < 1 degree
- S/N: > 58 dB, unified weighted

– **SDTV analog component video (passthrough)**

- Frequency response Y: +/- 0.5 dB max to 5 MHz
- Frequency response Pb, Pr: +/- 1.0 dB max to 2 MHz
- Component channel delay: < 8 ns
- Component S/N (Y, Pb, Pr): > 54 dB, unified weighted

Audio

- **Balanced analog inputs**
  - 2x stereo pair
  - 4x XLR female connectors
  - Nominal levels: +4 dBu (+4 dBm)
  - Input impedance: Hi-Z
  - Headroom (max level): 18 db
- **Balanced analog outputs**
  - 4x stereo pair
  - 8x XLR male connectors
  - Nominal levels: +4 dBu (+4 dBm)
  - Output impedance: 50 Ω
  - Headroom (max level): 18 db
- **Unbalanced digital (AES/EBU) input**
  - 2x stereo pair
  - 2x BNC connector (75 Ω), terminated
  - Maximum input level: 5 V_{p-p}
- **Unbalanced digital (AES/EBU) output**
  - 2x stereo pair
  - 2x BNC connector
  - Output impedance: 75 Ω
  - Nominal output level: 1V_{p-p}
- **Balanced analog audio performance**
  - Sampling frequency: 48 kHz (using 64x oversampling)
  - Quantization: 24 bits
  - S/N: > 85 db
  - THDN at 1 kHz, nominal level: < 0.05%

Environmental specifications

- Minimum/maximum ambient operating temperatures: 0 to 40º C
- Minimum/maximum storage temperature: –40 to 75º C
- Maximum altitude for operation: 3,000 meters
- Maximum altitude for transport: 12,000 meters
- Operating humidity: 20 to 80% relative humidity (non-condensing)
- Storage humidity: 5 to 95% relative humidity (non-condensing)

Matrox MXO2 LE specifications

General

- **Video formats** NTSC, PAL, NTSC-EIAJ, 1080p/i/PsF, 720p, 576p, 486p
- **Regulatory compliance**
  - FCC Class A, CE Mark Class A, ACMA C-Tick Mark, VCCI
  - RoHS Directive 2002/95/EC
- **Dimensions**
  - Length 237 mm (9.3")
  - Width 241 mm (9.5")
  - Height 51 mm (2")
- **External AC/DC adapter**
  - 100-240 VAC 50-60 Hz
  - Input: IEC320-C14 inlet
  - Output: +12V DC, 3A max
  - Dimensions: L 104 mm × W 46 mm × H 36 mm (4.1" × 1.8" × 1.4")
- **Total power consumption** 15 watts

Connections

- **Genlock reference input**
  - HD analog tri-level sync or SD analog bi-level black burst
  - BNC connector (75 Ω), terminated
- **RS-422** D-sub connector (9 pins)

Video

- **HDMI**
  - **HD input and output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (10-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
  - **SD output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (10-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
- **SDI**
  - **HDTV input**
    - HD-SDI with 16 channels of embedded SDI audio

- 24-bit, 48 kHz
- Compliant with SMPTE 292M, SMPTE 299M
- BNC connector (75 Ω), terminated
- Equalized input for maximum cable length support

– **HDTV output**

- HD-SDI with 16 channels of embedded SDI audio
- 24-bit, 48 kHz
- Compliant with SMPTE 292M, SMPTE 299M
- BNC connector (75 Ω)

– **SDTV input**

- SD-SDI with 16 channels of embedded audio
- 24-bit, 48 kHz
- BNC connector (75 Ω), terminated
- Equalized input for maximum cable length support
- Compliant with SMPTE 259M-C, SMPTE 272M

– **SDTV output**

- SD-SDI with 16 channels of embedded audio
- 24-bit, 48 kHz
- BNC connector (75 Ω)
- Compliant with SMPTE 259M-C, SMPTE 272M

• **S-Video and composite video input**

– **SDTV input**

- PAL, NTSC, NTSC-EIAJ
- BNC connector for composite (75 Ω), terminated
- 4-pin mini-DIN S-Video connector (75 Ω), terminated
- 12-bit ADC
- 2x oversampling
- Anti-aliasing filtering
- Automatic gain control

– **SDTV output**

- PAL, NTSC, NTSC-EIAJ
- BNC connector for composite (75 Ω)
- 4-pin mini-DIN S-Video connector (75 Ω)
- 12-bit DAC
- 8x oversampling

- **Analog component video input**
  - **HDTV input**
    - EIA-770.3 compliant
    - BNC connectors (75 Ω)
    - 12-bit ADC
    - Anti-aliasing filtering
  - **HDTV output**
    - EIA-770.3 compliant
    - BNC connectors (75 Ω)
    - 12-bit DAC
    - 2x oversampling
  - **SDTV input**
    - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
    - SMPTE/EBU N10 (PAL)
    - BNC connectors (75 Ω)
    - 12-bit ADC
    - 4x oversampling
    - Anti-aliasing filter
  - **SDTV output**
    - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
    - SMPTE/EBU N10 (PAL)
    - BNC connectors (75 Ω)
    - 12-bit DAC
    - 8x oversampling
- **Analog video performance**
  - **HDTV analog component video (passthrough)**
    - Frequency response Y: +/- 1.0 dB max to 28 MHz
    - Frequency response Pb, Pr: +/- 1.0 dB max to 12 MHz
    - Component channel delay: < 8 ns
    - Component S/N (Y, Pb, Pr): > 50 dB, unified weighted
  - **SDTV S-Video and composite video (passthrough)**
    - Amplitude error: < 4%
    - Frequency response: +/- 0.5 dB max to 5 MHz
    - 2T pulse response: 1.0% max
    - Diff. Gain: < 2%, Diff. Phase: < 1 degree

- S/N: > 58 dB, unified weighted

– **SDTV analog component video (passthrough)**
  - Frequency response Y: +/- 0.5 dB max to 5 MHz
  - Frequency response Pb, Pr: +/- 1.0 dB max to 2 MHz
  - Component channel delay: < 8 ns
  - Component S/N (Y, Pb, Pr): > 54 dB, unified weighted

Audio

- **Unbalanced analog audio inputs**
  – 1x stereo pair
  – RCA connectors
  – Input impedance: Hi-Z
  – Line level with 18 db headroom (max level)
- **Unbalanced analog audio outputs**
  – 1x stereo pair
  – RCA connectors
  – Output impedance: 100 Ω
  – Line level with 18 db headroom (max level)
- **Balanced analog inputs**
  – 1x stereo pair
  – 2x XLR female connectors
  – Nominal levels: +4 dBu (+4 dBm)
  – Input impedance: Hi-Z
  – Headroom (max level): 18 db
- **Balanced analog outputs**
  – 1x stereo pair
  – 2x XLR male connectors
  – Nominal levels: +4 dBu (+4 dBm)
  – Output impedance: 50 Ω
  – Headroom (max level): 18 db
- **Balanced and unbalanced analog audio performance**
  – Sampling frequency: 48 kHz (using 64x oversampling)
  – Quantization: 24 bits
  – S/N: > 85 db
  – THDN at 1 kHz, nominal level: < 0.05%

Environmental specifications

- Minimum/maximum ambient operating temperatures: 0 to 40º C
- Minimum/maximum storage temperature: –40 to 75º C
- Maximum altitude for operation: 3,000 meters
- Maximum altitude for transport: 12,000 meters
- Operating humidity: 20 to 80% relative humidity (non-condensing)
- Storage humidity: 5 to 95% relative humidity (non-condensing)

Matrox MXO2 Mini specifications

General

- **Video formats** NTSC, PAL, NTSC-EIAJ, 1080p/i/PsF, 720p, 576p, 486p
- **Regulatory compliance**
  - FCC Class A, CE Mark Class A, ACMA C-Tick Mark, VCCI
  - RoHS Directive 2002/95/EC
- **Dimensions**
  - Length 166 mm (6.5")
  - Width 110 mm (4.3")
  - Height 40 mm (1.6")
- **Operating voltages and power consumption**
  - Included AC/DC adapter: 100-240 V AC 50-60 Hz (5 V DC, 3 A max)
  - MXO2 Mini unit: 5-25 V DC, 2.5 mm barrel-type connector
    - 9 watts power consumption

Connections

Video

- **HDMI video**
  - **HD input and output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (10-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)
  - **SD output**
    - HDMI Y,Cb,Cr 4:2:2 (10-bit) / RGB (10-bit)
    - Eight channels of embedded audio
    - Standard Type A HDMI connector (19 pins)

- **Composite video** (not available if using analog component input/output)
  - **SDTV input**
    - PAL, NTSC, NTSC-EIAJ
    - RCA connector
    - 10-bit ADC
    - 4x oversampling
    - Anti-aliasing filtering
    - Automatic gain control
  - **SDTV output**
    - PAL, NTSC, NTSC-EIAJ
    - RCA connector
    - 12-bit DAC
    - 16x oversampling
- **S-Video** (not available when using analog component input/output)
  - **SDTV input**
    - PAL, NTSC, NTSC-EIAJ
    - RCA connectors
    - 10-bit ADC
    - 4x oversampling
    - Anti-aliasing filtering
    - Automatic gain control
  - **SDTV output**
    - PAL, NTSC, NTSC-EIAJ
    - RCA connectors
    - 12-bit DAC
    - 16x oversampling
- **Analog component video** (not available when using composite, or S-Video input/output)
  - **HDTV input**
    - EIA-770.3 compliant
    - RCA connectors
    - 10-bit ADC
    - Anti-aliasing filtering
  - **HDTV output**
    - EIA-770.3 compliant

    - RCA connectors
    - 12-bit DAC
    - 4x oversampling
  - **SDTV input**
    - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
    - SMPTE/EBU N10 (PAL)
    - RCA connectors
    - 10-bit ADC
    - 2x oversampling
    - Anti-aliasing filter
  - **SDTV output**
    - Betacam, Betacam SP (NTSC and NTSC-EIAJ)
    - SMPTE/EBU N10 (PAL)
    - RCA connectors
    - 12-bit DAC
    - 16x oversampling
- **Analog video performance**
  - **HDTV analog component video**
    - Frequency response Y: +/- 1.0 dB max to 28 MHz
    - Frequency response Pb, Pr: +/- 1.0 dB max to 12 MHz
    - Component channel delay: < 8 ns
    - Component S/N (Y, Pb, Pr): > 50 dB, unified weighted
  - **SDTV S-Video and composite video**
    - Amplitude error: < 4%
    - Frequency response: +/- 0.75 dB max to 5 MHz
    - Diff. Gain: < 2%, Diff. Phase: < 1 degree
    - S/N: > 54 dB, unified weighted
  - **SDTV analog component video**
    - Frequency response Y: +/- 0.75 dB max to 5 MHz
    - Frequency response Pb, Pr: +/- 1.0 dB max to 2 MHz
    - Component channel delay: < 8 ns
    - Component S/N (Y, Pb, Pr): > 54 dB, unified weighted

Audio

- **Unbalanced analog audio inputs**
  - 1x stereo pair
  - RCA connectors
  - Input impedance: > 10 kΩ
  - Line level with 18 db headroom (max level: +8 dBv)
- **Unbalanced analog audio outputs**
  - 1x stereo pair
  - RCA connectors
  - Output impedance: < 200 Ω
  - Line level with 18 db headroom (max level: +8 dBv)
- **Unbalanced analog audio performance**
  - Sampling frequency: 48 kHz (using 128x oversampling)
  - Quantization: 24 bits
  - S/N: > 90 db
  - THDN at 1 kHz, nominal level: < 0.02%
  - Frequency response: +/- 0.5 dB, 20 Hz to 20 kHz
  - Channel separation: > 100 db

Environmental specifications

- Minimum/maximum ambient operating temperatures: 0 to 40º C
- Minimum/maximum storage temperature: –40 to 75º C
- Maximum altitude for operation: 3,000 meters
- Maximum altitude for transport: 12,000 meters
- Operating humidity: 20 to 80% relative humidity (non-condensing)
- Storage humidity: 5 to 95% relative humidity (non-condensing)

Matrox MXO2 Thunderbolt adapter

- **Dimensions**
  - Length 87 mm (3.4")
  - Width 48 mm (1.9")
  - Height 19 mm (.75")
- **Power consumption** 3.6 watts
- **Minimum/maximum ambient operating temperatures** 0 to 40° C

Matrox PCIe host adapter specifications

Matrox PCIe host ExpressCard/34 adapter (for laptops)

- Standard ExpressCard/34
- Dimensions: L 96 mm × W 33 mm × H 13 mm (3.8" × 1.3" × 0.5")

Matrox PCIe host adapter (for desktops)

- Standard low-profile PCIe (x1) card
- PCB dimensions
  - L 66 mm × H 69 mm (2.6" × 2.7")
  - overall thickness including components: 19 mm (0.75")

Your notes

F

Matrox Customer Support

This appendix explains how you can register your Matrox product and obtain customer support.

How to get Matrox customer support

If you have a problem that you're unable to solve by referring to the documentation for your Matrox product, please contact your Matrox representative. He or she should be able to help you quickly correct any installation or system configuration problem.

If your representative is unable to solve your problem, contact Matrox for further information and assistance.

Registration

You can register your Matrox product in the Matrox Support section of our website at www.matrox.com/video/support.

Important Only registered users are entitled to customer support, software updates, special promotional offers, and access to our user forum.

Keep up to date with our website

In addition to registering your Matrox product, our website offers you up-to-the-minute information about Matrox products and software updates. Be sure to place our site in your favorites or bookmarks: www.matrox.com/video/support.

Contacting us

Matrox is proud to offer worldwide customer support. Please use the contact information for your Matrox product and area as provided on our website at www.matrox.com/video/support.

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Compliance Statements

USA

FCC Compliance Statement

Remark for the Matrox hardware products supported by this guide

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Changes or modifications to this unit not expressly approved by the party responsible for the compliance could void the user's authority to operate this equipment. The use of shielded cables for connection of the equipment and other peripherals is required to meet FCC requirements.

Canada

(English) Industry Canada Compliance Statement

Remark for the Matrox hardware products supported by this guide

These digital devices do not exceed the Class A limits for radio noise emission from digital devices set out in the Radio Interference Regulation of Industry Canada.

(Français) Conformité avec les exigences de l'Industrie Canada

Remarque sur les produits matériels Matrox couverts par ce guide

Ces appareils numériques n'émettent aucun bruit radioélectrique dépassant les limites applicables aux appareils numériques de Classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par Industrie Canada.

Europe

CE

(English) European user's information – Declaration of Conformity

Remark for the Matrox hardware products supported by this guide

These devices comply with EC Directive 2006/95/EC for a Class A digital device. They have been tested and found to comply with EN55022/CISPR22 and EN55024/CISPR24. In a domestic environment these products may cause radio interference in which case the user may be required to take adequate measures. To meet EC requirements, shielded cables must be used to connect the equipment and other peripherals. Analog A/V cables connected to Matrox MXO2 Mini must be limited to less than three meters to comply with EEC and EMC directives. These products have been tested in a typical Class A compliant host system. It is assumed that these products will also achieve compliance in any Class A compliant system.

(Français) Informations aux utilisateurs Européens – Déclaration de conformité

Remarque sur les produits matériels Matrox couverts par ce guide

Ces unités sont conformes à la directive communautaire 2006/95/EC pour les unités numériques de classe A. Les tests effectués ont prouvé qu'elles sont conformes aux normes EN55022/CISPR22 et EN55024/CISPR24. Le fonctionnement de ces produits dans un environnement résidentiel peut causer des interférences radio, dans ce cas l'utilisateur peut être amené à prendre les mesures appropriées. Pour respecter les impératifs communautaires, les câbles de connexion entre l'équipement et ses périphériques doivent être blindés. Afin de se conformer aux exigences des directives de la CEE et de l'EMC, les câbles analogiques audio/vidéo reliés à Matrox MXO2 Mini ne doivent pas dépasser trois mètres. Ces produits ont été testés dans un système hôte typique compatible classe A. On suppose qu'ils présenteront la même compatibilité dans tout système compatible classe A.

(Deutsch) Information für europäische Anwender – Konformitätserklärung

Anmerkung für die Matrox Hardware-Produktunterstützung durch dieses Handbuch

Diese Geräte entsprechen EG Direktive 2006/95/EC für ein digitales Gerät Klasse A. Sie wurden getestet und entsprechen demnach EN55022/CISPR22 und EN55024/CISPR24. In einer Wohnumgebung können diese Produkte Funkinterferenzen erzeugen, und der Benutzer kann genötigt sein, entsprechende Maßnahmen zu ergreifen. Um EG-Anforderungen zu entsprechen, müssen zum Anschließen des ausrüstung und anderer Peripheriegeräte abgeschirmte Kabel verwendet werden. Analoge A/V Kabel, die an Matrox MXO2 Mini angeschlossen werden, müssen eine Länge von weniger als drei Metern aufweisen um den EWG-und EMV-Richtlinien zu entsprechen. Diese Produkt wurden in einem typischen, der Klasse A entsprechenden, Host-System getestet. Es wird davon ausgegangen, daß diese Produkte auch in jedem Klasse A entsprechenden System entsprechend funktionieren.

(Italiano) Informazioni per gli utenti europei – Dichiarazione di conformità

Nota per i prodotti hardware Matrox supportati da questa guida

Questi dispositivi sono conformi alla direttiva CEE 2006/95/EC relativamente ai dispositivi digitali di Classe A. Sono stati provati e sono risultati conformi alle norme EN55022/CISPR22 e EN55024/CISPR24. In un ambiente domestico, questi prodotti possono causare radiointerferenze, nel qual caso all'utente potrebbe venire richiesto di prendere le misure adeguate. Per soddisfare i requisiti CEE, l'apparecchiatura e le altre periferiche vanno collegati con cavi schermati. I cavi analogici A/V collegati a Matrox MXO2 Mini devono essere limitati a meno di tre metri per essere conformi alle direttive di contabilità elettromagnetica e del EEC. Questi prodotti sono stati provati in un tipico sistema host conforme alla Classe A. Inoltre, si dà per scontato che questi prodotti acquisiranno la conformità in qualsiasi sistema conforme alla Classe A.

(Español) Información para usuarios europeos – Declaración de conformidad

Observación referente a los productos de hardware de Matrox apoyados por este manual

Estos dispositivos cumplen con la directiva de la CE 2006/95/EC para dispositivos digitales de Clase A. Dichos dispositivos han sido sometidos a prueba y se ha comprobado que cumplen con las normas EN55022/CISPR22 y EN55024/CISPR24. En entornos residenciales, estos productos pueden causar interferencias en las comunicaciones por radio; en tal caso el usuario deberá adoptar las medidas adecuadas. Para satisfacer las disposiciones de la CE, deberán utilizarse cables apantallados para conectar el equipo y demás periféricos. Los cables análogos de A/V conectados con Matrox MXO2 Mini se deben limitar a menos de tres metros para conformidad con las directivas del EEC y del EMC. Estos productos han sido sometidos a prueba en un típico sistema anfitrión que responde a los requisitos de la Clase A. Se supone que estos productos cumplirán también con las normas en cualquier sistema que responda a los requisitos de la Clase A.

www.matrox.com/video